The integration of share repurchases into US and UK listed firms' financial decision-making

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Abstract

This study explores the question whether share repurchases are an integral part of US and UK firms' financial decision-making, or whether they are merely an afterthought and therefore not systematically related to managers' principal financial decisions, namely dividends, investment and leverage. It aims to address concerns that share repurchases might be detrimental to firms' ability to create value through investment (FINNOV, 2012) and can lead to the excessive leverage of companies (Foroohar, 2013). As the US and the UK display differences in terms of the legal and institutional environment, the first two chapters focus in the US and the UK respectively. The US findings indicate that share repurchases are driven not merely by free cash flows, but also by decisions about investment and dividends, and both dividends and investments are in turn affected by share repurchases. The fact that these results hold both for the period before and subsequent to the credit crunch suggests that share repurchases have become an essential consideration when managers take financial decisions in large US firms. By contrast, the UK research fails to show a consistent interaction between share repurchases and investment. Moreover, the findings suggest that share repurchases are being used as a complementary form of payout and not as a substitute. Considering the differences in the results from the first and second empirical chapter, the question arises, whether these are due to differences in the sample characteristics, as the size of S&P 500 companies tends to much larger than that of FTSE All Share Index companies, or whether they reflect country-specific institutional differences. This question is explored in the third empirical chapter. This research supports the contention that national differences in terms of regulatory frameworks and the development of financial markets can affect corporate decision-making (e.g. Bennedsen and Nielsen 2010, La Porta et al. 2000). More specifically, country specific factors appear to lead to a lower use of share repurchases in the UK possibly due to the stricter regulatory framework. In addition, UK firms seem to try to maintain higher dividend payout ratios than their US counterparts, which can be attributed to a culture of high dividend payouts. These differences seem to explain the non-integration of share repurchases into UK firms' financial decision-making. Therefore, without considering country specific factors, it is not feasible to generalise economist concerns that share repurchases can be detrimental to firms' ability to create value through investment (FINNOV, 2012) and for leading to the excessive leverage of companies (Foroohar, 2011).

Declaration

The material contained in this thesis has not been previously submitted for a degree in this or any other university.

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1. Introduction

Share repurchases have become increasingly commonplace during the last two decades both in the US and in the UK. More specifically, in the US the majority of publicly listed firms distribute funds both through dividends and share repurchases (Floyd et al. 2013), and in 1999, 2000, 2004, 2005 and 2006 the annual level of share repurchases actually surpassed that of cash dividends (Dittmar 2008). Throughout the 1990s UK firms exhibited Europe's largest share repurchase activity, accounting for between 60% and 80% of EU share repurchases (Rau and Vermaelen 2002; Stonham 2002). Dhanani and Roberts (2009) report that in the UK share repurchases rose from £10 billion in the late 1990s to £46 billion in 2006, while the number of listed companies buying back shares rose from 14% in 1997 to 58% in 2006.

So far, there has been a wide range of research, which focused on the motives behind share repurchases and their effect on the repurchasing firms' value (Allen and Michaely, 2002). Findings from this research tend to agree on three main motives. Firms buy back their shares as an investment decision to take advantage of potential undervaluation, to distribute excess capital and to mitigate the dilution effect of stock options (Dittmar 2000; Brav et al. 2005; Chan et al. 2007; Dixon et al. 2008; Dhanani and Roberts 2009; Young and Yang 2011). Moreover, research in various markets consistenlty suggests that share repurchase announcements and actual repurchases are followed by abnormal positive returns (Kahle 2002; Oswald and Young 2004; Wang et al. 2009).

However, the related research has failed to address the impact of share repurchases on other financial decisions. Previous literature has highlighted

the importance of the interactions between key financial decisions, such as investment, leverage and corporate pay-out policies (see McCabe 1979; Jensen et al. 1992; Barclay et al. 1995; Noronha et al. 1996; Crutchley et al. 1999; Faulkender et al. 2006; Ding and Murinde, 2010; Aggarwan and Kyaw 2010). Faulkender et al. (2006, p.1) argues that *"the literature has treated dividend policy and capital structure as two distinct choices, even though there is reason to believe that there are common factors affecting both*''. Similarly, Aggarwal and Kyaw (2010, pp.142) argue that ''*because of the interdependence between dividend policy and capital structure, empirical studies of capital structure … are most likely mis-specified unless they include an assessment of dividend policy"*. This issue was highlighted already in 1979 by McCabe (1979) who argued that firms have access to limited funds, which managers allot to either dividend payments and/or investments. This suggests that capital structure, payout and investment policy are interdependent. However, present research in the area has so far largely failed to take account of this interdependence (e.g Huang and Song 2006; Li and Zhao 2008; Brown and Sum 2010). While there has been research into the relationship e.g. between share repurchases and dividend pay-outs (see Jagannathan et al. 2000; Grullon and Michaely 2002) so far it appears that there has been no research which investigates the possible interaction between share repurchases and other key financial decisions such as investment and leverage. Therefore, given the increased economic importance of share repurchases this study aims to fill this relevant gap in the literature. Such a study is of particular importance given publicly voiced concerns regarding the use of share repurchases. EU, similar to US firms, have been criticized to use share buybacks as a mean to recycle capital and to prop up share prices

instead of investing in capital expenditures and promoting growth (Laurent, 2015). Moreover, this form of payout has been associated with distorted incentives such as to mitigate the EPS dilution effect of stock options and has been argued to undermine productive investment (see FINNOV, 2012 a,b) and lead to the excessive leverage of companies (Foroohar, 2013). As this research, aims to provide empirical evidence regarding these concerns, its findings are expected to be of importance to regulators and investors alike. The relationship between share repurchases and investment is of particular importance to regulators as well as long-term investors as a negative effect might limit funds available for investment thus harming economic recovery. If indeed, such concerns are substantiated regulatory authorities might consider a stricter regulatory framework regarding share repurchases. As firms' behaviour might differ during booms and recessions, this research considers both the period before and after the 2008 financial crisis.

In order to estimate our system of equations we employ a number of parametric and non-parametric estimations methods. In addition, to the traditional OLS, we use two-stage Least Squares (2SLS) and three-stage Least Squares (3SLS). Gujarati (2004) suggests 2SLS and 3SLS, in the presence of endogeneity issues, however the author underlines the difficulty of finding valid instruments. Nevertheless, the use of 2SLS and 3SLS is common in studies which employ systems of equations (see McCabe. 1979; Jensen et al. 1992; Noronha et al. 1996; Crutchley et al. 1999; Ding and Murinde 2010; Aggarwan and Kyaw). However, 2SLS and 3SLS estimations often suffer from weak instrument issues while most studies which employ instrumental variables do not report tests regarding their validity (see Jensen et al. 1992; Noronha et al. 1996; Adedeji 1998; Crutchley et al. 1999; Ding and Murinde

2010, Aggarwal and Kyaw 2010). Furthermore, regression results from some of the aforementioned studies (see McCabe 1979; Crutchley et al. 1999) suggest weak instrument issues. For example, McCabe uses stock's beta as an instrument for dividends. His findings suggest that this is a weak instrument as it appears statistically insignificant in his estimations. Another example can be found in the study by Crutchley et al. (1999). The authors use sales growth and investment as instruments for dividends. Investment appears to be statistically insignificant and sales growth is not consistenlty[1] statistically significant. However, instrument validity is not usually discussed or tested. This might be due to the difficulty of finding valid instruments underlined by Gujarati (2004). Woolridge (2006) underlines invalid instruments can produce poorer results than Ordinary Least Squares (OLS), since the relevant 2SLS and 3SLS estimators can have large standard errors and large asymptotic bias. Therefore, in order to consider the robustness of the results, this study also employs OLS and two non-parametric estimation techniques, specifically median regressions and regressions with bootstrapped standard errors. The use of non-parametric estimation techniques is also expected to address normality issues in financial data.

As financial decisions are considered long-term decisions, we follow the previous literature and consider financial decision-making over time. Therefore, average values are used as these more closely reflect the long-term nature of these key financial decisions (see Adedeji, 1998).

[1] The authors investigate simultaneity between leverage, dividends, insider and institutional ownership in two periods 1987 and 1993. Sales growth is statistically insignificant in the 1987 estimations.

In addition, the credit crunch offers this study a unique period to test the integration of share repurchases into financial decision-making. The period before the credit crunch was characterized by a relative high amount of liquidity in the market whereas the period after low growth opportunities and illiquidity. It might be that share repurchases are a complementary non-core financial decision associated with high liquidity and likely to be marginalized in periods of financial uncertainty and illiquidity. Therefore, this research considers the period both before and after the credit crunch and more specifically 2005-11. Taking into account that the recession originated in Q.2 2008 (see Figure 3), this period is divided into two subsamples 2005-2008 and 2008-2011. Keeping this in mind and assuming the long-term nature of financial decisions, we expect that during 2008 many firms readjusted their financial policies in light of the liquidity crisis triggered by the collapse of Lehman Brothers in September 2008 and the 2008-2009 recession. Thus, 2008 is included in both periods.

Therefore, in order to address both the lack of research into the relationship between share repurchases, dividends as well as investment and leverage and concerns about misspecification in previous research into financial decision-making, this study initially investigates jointly capital structure, payout and investment policies within a system of equations using a sample of large US companies. As share repurchases are especially prevalent in the USA, both in terms of magnitude and frequency (Dittmar 2008, Floyd et al. 2013), US firms are particularly likely to integrate share repurchase programs systematically into their financial decision-making. Therefore, the first chapter of this thesis investigates the interactions between share repurchases and dividends, investment and leverage in the US market. The findings indicate that both in

the period before and after the credit crunch key financial decisions about share repurchases, dividends and investment were interrelated. Specifically, we document a robust negative relationship between share repurchases and investment. This suggests that US managers consider share repurchases as an important alternative to investment when they set their corporate policies. This finding appears to provide empirical support for concerns that share repurchases might undermine productive investment (Lazonick 2008; FINNOV 2012).

However, it is not feasible to generalise the US findings because they could be related e.g. to culture, managerial experience or differences in financial, labour and capital markets (Rajan and Zingales 1995; Bond et al. 1996; Short and Keasey 1999; La Porta et al. 2000 Armour et al. 2002; Dhanani 2005; Bennedsen and Nielsen 2010). As different institutional settings might produce different results, the next chapter investigates the integration of share repurchases into another market where share repurchases are well established, namely the UK.

The UK is the ideal market to further this study because of two reasons. First, share repurchases are comparatively well established in the UK. Secondly, the UK displays a number of differences compared to the US regarding its institutional and regulatory environment. In addition, due to the magnitude and frequency of share repurchases in the UK economists have expressed similar concerns, as in the US, regarding the impact of share repurchases on investment (FINNOV, 2012 a, b). In the EU, similar to the USA, firms have been criticized to use share buybacks as a mean to recycle capital and to prop up share prices instead of investing in capital expenditures and promoting

growth (Laurent, 2015). Critics (see FINNOV, 2012 a, b) argue that, as share repurchases reduce the number of shares outstanding, managers might use share repurchases primarily to manipulate firm's earnings per share (EPS) ratios, as earnings are distributed across a lower number of shares. Therefore, an investigation regarding the relationship between share repurchases and investment is equally important in the UK. Moreover, research in the UK has not provided clear empirical evidence whether or not UK firms substitute dividends for share repurchases. Therefore, considering the frequency and magnitude of share repurchases in the UK, the aforementioned interrelations in financial decision-making are of concern to UK policy makers and long-term investors.

Like in the US case, these interrelations are examined in the UK for both the pre and crisis period, specifically (2005-08 and 2008-11). The relationship between both forms of payout, dividends and share repurchases, and investment is of particular importance in the post crisis period as there have been concerns that the diversion of funds from investment to payouts can be harmful in periods of economic recovery (Griffiths and Wall 2007; FINNOV 2012).

The findings from Chapters 3 and 4 suggest that there are similarities but also significant differences in the factors that drive key financial decisions, in particular share repurchases, between the USA and the UK. As far as similarities are concerned, in both the US and the UK we document a negative interdependence between dividends and investment. Moreover, in both countries share repurchases do not seem to influence firms' capital structure. However, while for the USA the findings provide evidence that share

repurchases have become an integral part of large firms' financial decision-making, this does not appear to be the case for the UK.

In the US, share repurchases seem to be driven not merely by free cash flows but also by decisions about investment and dividends, and both dividends and investments are in turn affected by share repurchases. This indicates that share repurchases have become an essential consideration when managers take financial decisions in large US firms. Moreover, the fact that these results hold both for the period before and subsequent to the credit crunch suggests that, while firms' overall pay-out ratios fell, in general the credit crunch did not lead managers to marginalize share repurchases over dividend payments or vice versa. The robust negative interaction between share repurchases and investment suggests that concerns that share repurchases can undermine productive investment (see FINNOV, 2012) are substantiated for the US market.

In general, the UK findings suggest that share repurchases are not systematically related to managers' other principal financial decisions. In contrast to the USA, in the UK, the negative interaction between share repurchases and investment is not consistent as it holds only for the pre-crisis period. Therefore, concerns that share repurchases might withdraw funds from productive investment, especially significant in times of economic recession and recovery seem not to be substantiated in the case of the UK.

In addition, the UK research does not support interdependence between dividends and share repurchases. Instead, UK managers appear to use share repurchases as a flexible mean to reduce free cash flows and/or to fund stock

options. The findings therefore indicate that in the UK share repurchases are not used a dividend substitute.

The aforementioned differences might suggest that national differences in the development of capital, financial and goods markets as well as regulatory frameworks and corporate governance systems can influence corporate behaviour (see Rajan and Zingales 1995; Bond et al. 1996; Short and Keasey 1999; La Porta et al. 2000 Armour et al. 2002; Dhanani 2005; Bennedsen and Nielsen 2010). However, documented differences could also be attributed to firm characteristics. For example, in this research we draw on a US sample of non-financial companies included in the S&P 500 index, whereas the UK sample draws on non-financial companies included in the FTSE All Share Index. Consequently, firms in the US sample are on average significantly larger than the firms in the UK sample. Even if we would curtail the UK sample to the FTSE 100 index, a noticeable size difference between the firms in the two different samples would be maintained. So, the resulting question is if the US-UK differences can be attributed to country specific factors or different firm characteristics due to sample choice.

Therefore, in the fifth chapter, this study investigates whether differences between the US and UK results are driven by firm characteristics or by country specific differences. This research seems worthwhile, as it will contribute to knowledge by indicating the degree to which different cultural, structural or regulatory reasons influence corporate behaviour or whether US-UK differences can be explained by firm-specific characteristics, such as firm size. This is expected to be of importance to regulators and investors especially in the case of the integration of share repurchases into financial decision-making.

If such factors do indeed influence corporate behaviour then economists' concerns that share repurchases can be detrimental to firms' ability to create value through investment (FINNOV, 2012) should not be generalized.

The findings from Chapter 5 suggest that country specific factors lead to a lower use of share repurchases in the UK possibly, due to the stricter regulatory framework as supported by Rau and Vermaelen (2002). Moreover, UK firms, all else equal, seem to try to maintain higher dividend payout ratios than their US counterparts. This might be attributed to a culture of high dividend payouts in the UK as well as the reluctance of managers to reduce these (see Bond et al. 1996; Allen and Michaely 2003; Griffiths and Wall 2007; Cook 2014). Finally, the UK environment seems to have lead to comparatively more levered firms despite the stricter bankruptcy code in the UK. This might be associated with the historically higher UK dividend payout ratios. As firms' cash flows fluctuate, UK firms may have used relatively higher debt financing in order to sustain the higher dividend payout ratios. It seems that differences in country specific factors can affect the integration of share repurchases in financial decision-making and explain discrepancies between the US and UK findings.

Summarizing, this thesis provides empirical evidence that share repurchases are an integral part of US managers' financial decision-making. Specifically, it provides evidence of a negative interdependence between share repurchases, dividends and investment in US firms. Thus, it appears that share repurchases are taken into consideration by US managers when financial policies are set. In particular the finding that share repurchases and investment in US firms are negatively related underlines existing concerns that in the US share

repurchases can have a negative impact on firm investment, which might be detrimental not only to the long-term growth of individual companies but the economy as a whole.

In addition, the findings suggest that this is not the case with UK firms. Share repurchases seem not to be integrated into UK firms' financial decision-making. The UK findings suggest only interdependence between dividends and investment. Therefore, economist concerns that share repurchases might undermine productive investment are not substantiated for the UK market.

The findings from the fifth chapter suggest that the reason for differences regarding the integration of share repurchases into US and UK financial decision-making is differences in country specific factors such as the regulatory and institutional environment. These findings are expected to be of importance to regulators and investors alike considering the increasing economic importance of share repurchases and the related concerns regarding their impact on firms' financial decision-making.

The rest of this thesis is structured as follows. Chapter 2 discusses extant capital structure and payout policy theories and identifies links between capital structure, dividends, share repurchases and investment. Chapter 3 focuses on the integration of share repurchases in large non-financial US firms' financial decision-making. It begins by providing a review of relevant payout and capital structure theories and identifies possible relations regarding capital structure, dividend payout, share repurchases and investment in the US market. Consequently, a description of the data and an explanation of the chosen research methodology are provided. This is followed by a description and interpretation of the empirical results and the conclusion.

Chapter 4 investigates the integration of share repurchases in UK firms' financial decision-making. Chapter 4 begins by discussing financial decision-making in the UK. This is followed by a description of the data and the chosen research methodology. Consequently, the UK empirical results are described and interpreted, before the chapter concludes.

Chapter 5 investigates whether differences between the US and UK results are driven by country specific differences or by differences in firm characteristics. It begins by discussing country-specific differences between the US and the UK in terms of bankruptcy, tax codes and corporate governance. Because of differences in the development and the impact of the financial crisis, it will consider the impact of the financial crisis on both countries. In addition, Chapter 5 will consider how the aforementioned differences influenced the financial decisions under investigation. This is followed by a description of the data and the chosen research methodology. Consequently, the empirical results are described and interpreted followed by the conclusion.

Chapter 6 concludes this thesis.

2. Literature review

2.1 Introduction

Corporate decision-making regarding capital structure and dividend policy has puzzled finance scholars for a number of decades. Up to now, research into these two key areas of Corporate Finance has led to the development of a number of significant theories and empirical studies. However, both the ''Capital Structure Puzzle'' (Myers, 1984) and ''Dividend Puzzle'' (Black, 1976) remain unsolved. The determination of these two policies is amongst the most basic managerial duties. Therefore, further research in this area is worthwhile.

The importance of payout policy to managers and investors alike is underlined by Allen and Michaely (2003) who highlight the need to repeat and reevaluate this decision over time, the substantial amounts of money involved and the interaction of payout policy with other firm's financial decisions (e.g. investment). Capital structure decisions can be considered equally important due to their interaction with investment and payout decisions.

Research in both areas has followed an almost identical path as the ''Capital Structure Irrelevance'' and the ''Dividend Irrelevance'' theorems of Modigliani and Miller (hereafter M&M) in 1958 and 1961 respectively, heavily influenced it. The main idea of Modigliani and Miller was that real value could not be created just by a financing or payout policy decision but only through a firm's operations and choice of investment projects. However, the two theorems are based on a rather unrealistic set of conditions where among others there are no transaction costs, no taxes, no agency and bankruptcy costs and all investors share the same information. From that point onwards, researchers have focused on lifting these assumptions and investigating the resulting effects. This has led to a number of significant theories for capital structure and dividend policy, each derived from the relaxing of one or more of Modigliani and Miller restrictions. Even though these theories and their related empirical studies provide us with valuable insights and describe at least some aspect of the firms' financial decision-making, they often have empirical shortcomings (Barclay et al. 1995; De Angelo and De Angelo 2007). An example regarding one of the most dominant capital structure theories, the Pecking Order theory, is provided by Myers (1984). The Pecking Order theory suggests that firms prefer debt financing to equity financing due to its lower asymmetric information costs. However, Myers (1984) points out that the

Pecking Order theory cannot fully explain reality, as there are cases when equity was issued when debt financing was available.

Furthermore, the well-documented rise of share repurchases as an important payout mechanism in the US and the UK has made the task of explaining financial decision-making in firms' behaviour even more complex. A body of literature (see Allen and Michaely 2002; Oswald and Young 2004; Dhanani and Roberts 2009) which often borrowed theories from dividend policy tries to explain the phenomenon of share repurchases. Research in this area seems to have identified some possible share repurchase determinants (Ditmmar 2000; Bancel et al. 2005; Dhanani and Roberts 2009). Firms use share repurchases as an investment decision to take advantage of potential undervaluation, to distribute free cash flows and to mitigate the dilution effect of stock options (Dittmar 2000; Brav et al. 2005; Chan et al. 2007; Dixon et al. 2008; Dhanani and Roberts 2009; Young and Yang 2011). Since free cash flows can be distributed via dividend payouts, a number of authors suggest that share repurchases are used as dividend substitutes. However, existing research has not provided us with a clear answer on whether this is the case.

An important observation regarding the abovementioned research and its efficiency is that the majority of theoretical and empirical literature has tried to explain corporate financial policies independently from each other. Faulkender et al. (2006, p.1) argues that *''the literature has treated dividend policy and capital structure as two distinct choices, even though there is reason to believe that there are common factors affecting both*''. Similarly, Aggarwal and Kyaw (2010, pp.142) argue that ''*because of the interdependence between dividend*

policy and capital structure, empirical studies of capital structure … are most likely mis-specified unless they include an assessment of dividend policy".

McCabe (1979) who argued that firms have access to limited funds, which managers allot to either dividend payments and/or investments, highlighted this issue already in 1979. This suggests that capital structure, payout and investment policy are interdependent. However, present research in the area has so far largely failed to take account of this interdependence (e.g Huang and Song 2006; Li and Zhao, 2008; Brown and Sum 2010).

As previously highlighted, from a theoretical perspective, the most famous theories which explored the determinants of capital structure and dividend policies largely focused on lifting the very restrictive assumptions Modigliani and Miller (1958; 1961) proposed to justify their "Capital Structure Irrelevance'' and ''Dividend Irrelevance'' theorems (see table 1).

Table 1 Capital Structure and Payout Policy theories

	Asymmetric information	**Agency costs**	**Taxes (corporate and personal, dividend and capital gains)**
Capital Structure	The Pecking Order Theory	Agency theory and the theory of free cash flows	Trade Off theory
Dividends	Signaling theory	Agency theory and the theory of free cash flows	Tax Clientele theory
Share Repurchases	Signaling theory	Agency theory and the theory of free cash flows	Tax Clientele theory

As Faulkender et al. (2006) and Aggarwan and Kyaw (2010) underline some of these theories are applicable to two or more of the financial policies under consideration.

Pecking Order theory (Myers, 1984), for instance, links capital structure and dividend policy as it hypothesizes that firms adjust their dividend payments while considering retained earnings and investment opportunities.

Agency theory can also be used to establish a link between capital structure and dividend policy. Easterbrook (1984) for example suggests that firms pay out dividends although this means that they consequently have to issue equity or debt in order to fund new investment opportunities. Issuing dividends reduces the free cash flow in a company, which decreases the possibility for opportunistic behaviour by managers or inside blockholders. If firms never-the-less require additional capital to pursue profitable investment opportunities, they need to convince investors of the profitability of these projects. Both factors serve to reduce the agency costs in firms.

Only a comparatively few papers (McCabe 1979; Jensen et al. 1992; Barclay et al. 1995; Noronha et al. 1996; Crutchley et al. 1999; Faulkender et al. 2006; Ding and Murinde 2010; Aggarwan and Kyaw, 2010) draw on these considerations to investigate jointly, capital structure and dividend policy. Studies which examine the possibility that capital structure and dividend policy are simultaneously determined are even rarer (e.g. Noronha et al. 1996; Crutchley et al. 1999; Ding and Murinde 2010), though their findings generally support the contention that capital structure and dividend policy are interdependent.

However, none of these studies includes share repurchases in their modeling. While historically dividends represent the most common and widely used method of payout, as discussed earlier, more recently importance of share repurchases for corporate payout policies has noticeably increased[2], both in the USA and in the UK (DeAngelo et al. 2008; Dhanani and Roberts 2009). It is therefore highly probable that previous models used to investigate these financial decisions are misspecified and suffer from endogeneity problems (Aggarwan and Kyaw, 2010). Moreover, since there are common factors affecting two or more of the financial decisions, the resulting spurious correlations can lead to inappropriate causality inferences (Jensen et al. 1992; Faulkender et al. 2006). This study accounts for share repurchases and the interdependence in financial decision-making thus dealing with the aforementioned methodological concerns.

The magnitude and frequency of share repurchases has lead to economists' concerns that share repurchases might undermine productive investment (see Laurent 2015; FINNOV 2012). Specifically, US and EU firms have been criticized to use share buybacks as a mean to recycle capital and propping up share prices instead of investing in CAPEX and promoting growth (Laurent, 2015). However, the impact of share repurchases on investment so far remains unaddressed. The impact of share repurchases on investment is of particular importance in the light of the financial crisis originating in 2007/08

[2] More specifically, as (De Angelo et al. 2008) point out, the value of both gross and net share repurchases surpassed that of cash dividends after 2000 in the US. For the UK Dhanani and Roberts (2009, pp. 1) report that :

> *"In the UK, repurchase activity… rose to an annual spend of 10 billion in the late 1990s, approximately eight times higher than that a decade earlier (Lasfer, 1998). Repurchase activity continued to soar during the first few years of the21st century, and it is estimated that in 2006 British companies spent a record 46 billion on buying back their shares(Durrant, 2007), a remarkable growth rate of 64% on the previous year..)."*

as any diversion of funds from investment to share repurchases can negatively influence economic recovery. Furthermore, falling demand, limited access to external finance and falling income as well as the lack of investment opportunities are all expected to have a direct effect on firms' investment, capital structure, share repurchases and dividends decisions. Therefore, this study investigates the interrelations between share repurchases and key financial decisions, in the US and the UK, for both the pre and crisis period, specifically (2005-08 and 2008-11). This methodology is used in order to check if the impact of share repurchases on other financial decisions holds irrespective of different macroeconomic conditions. By observing possible differences in the reactions of US firms and UK firms to the 2007/08 financial crisis, we hope to gain more insight into their financial decision-making. We expect the impact of the financial crisis on companies in the US and the UK to differ because of their different institutional and economic environments and the different scales of government interventions. The understanding of corporate behaviour in terms of its financial decisions especially during a crisis might be worthwhile to regulatory authorities.

Therefore, it seems that research into the relationship between dividend payouts and share repurchases, capital structure decisions and investment is a timely endeavor.

More specifically this research project aims to contribute to filling the gaps in the literature mentioned so far by investigating the following questions:

- To which degree are capital structure, payout and investment decisions of firms interdependent? Are share repurchases and dividend substitutes? Are payouts and investment competing uses of funds?

In this context, the research will explore alternative methods to model this interdependence, in order to investigate how far these decisions are simultaneously determined and whether the use of simultaneous equation modeling can help develop our understanding of these issues.

- When the interdependence of decisions about capital structure, payout and investment is taken into account, is there a dominant theory that can help to explain firms' decisions in this area?

  In order to facilitate this research we will in particular investigate, what are the most influential factors that affect capital structure and payout policy decisions. To identify relevant factors we will draw on a review of historical and recent relevant theories and empirical research.

- Initially, this research focuses on US listed non-financial companies. However, as a second stage we use a sample of UK listed non-financial firms to explore whether there are significant differences in capital markets that use share repurchases. Since this is the case, we investigate whether these can be explained by cultural, structural, regulatory and/or other reasons.
- Has corporate behaviour in terms of capital structure and payout policy been affected by the global recession originating in 2008? If yes, how did firms readjust their capital structure, investment and payout policies?

  Since repurchases can be used as a mechanism to support falling prices and enhance market liquidity, it will be interesting to observe how firms with different characteristics such as growth opportunities and cash reserves responded to the credit crunch.

  Summarizing, this study aims to contribute to our knowledge about companies' financial decision-making in the following ways:

- This study will belong to only a limited number of empirical studies that investigate jointly capital structure and payout policy. Based on an extensive literature review it appears that this will be the first study, which will take account not only of dividend payments but also of share repurchases.
- This study aims to improve our understanding of the validity of different historical and current theories in explaining capital structure and pay-out decision using recent data.
- By investigating capital structure, dividends and share repurchases in two countries (USA, UK) we hope to contribute to our understanding how different cultural, structural or regulatory reasons influence these financial decisions.
- The global recession originating in 2008 provides this study with a unique time framework. An observation of possible changes in the relative importance of the determinants of corporate financial decision-making, before and after 2008 might provide us with more insight into corporate strategic behaviour

The following section will begin by presenting the most influential theories and related empirical research regarding capital structure, dividends and share repurchases. By doing so it will help explain how these theories provide linkages between certain financial policies. The last part of this chapter will present a number of empirical studies that have evaluated jointly certain financial policies and investigated the possibility that they are simultaneously determined.

2.2 Capital structure theories

2.2.1 Introduction

The term Capital Structure refers to the financing mix that firms utilize to fund their investments. This financing mix consists of equity, debt and hybrid

securities. A firm's choice of a capital structure and especially its relationship to the firm's value has been extensively discussed within the Corporate Finance literature. Two basic questions lie at the heart of this research. Does the capital structure choice affect firm value? If yes, is there an optimal capital structure?

One of the most frequently cited and influential papers that attempted to answer the first question is Modigliani and Miller's (M&M) (1958) '' The cost of capital. Corporation finance, and the theory of investment''. Their famous ''irrelevance'' proposition included in their 1958 paper, argues that the value of a firm is independent of its capital structure. The authors argue that value depends only on the success of the firm's investments and its ''real'' operations. However, M&M (1958) come to this conclusion while assuming that certain unrealistic conditions are met. More specifically, they assume perfect and frictionless capital markets where taxes, transactions costs, agency and bankruptcy costs do not exist. Even though these conditions are not met in the ''real world'', Barclay et al. (1995) point out that the practical value of the M&M proposition was to direct future research towards the factors that do matter and therefore must be taken into consideration when the method of financing is decided.

To date, finance scholars, have lifted the assumptions of the M&M proposition and incorporated market frictions into their analysis (see Jensen and Meckling 1976; Miller 1977, Myers 1984). This led to the development of various theories. The most significant amongst them are Trade Off, Asymmetric Information theory and Agency theories. As Myers (2001) explains, the Trade Off theory emphasizes taxes, Agency theory emphasizes in agency costs and

the Asymmetric information theory (Pecking Order theory) emphasizes in differences in information regarding the firm's real value and prospects between insiders and investors.

2.2.2 The Capital Structure Irrelevance theory.

This chapter is going to start by providing a summary of the MM (1958) paper since it is a seminal paper in the Capital Structure literature that is considered to have fueled and on the same time directed research in this area. Afterwards the most well known theories regarding capital structure are going to be presented.

The M&M (1958) paper includes three Propositions. Proposition I, also known as the ''Capital Structure Irrelevance'' theory states that the value of a firm is independent of its financing method. In order to reach this conclusion MM make a series of restrictive assumptions. Their theory is developed within a framework of perfect capital markets where: i) there are no transaction costs , no taxes, no agency and bankruptcy costs ii) investors can borrow at the same terms as firms do iii) all investors share the same information, have the same expectations of the firms' expected returns and behave accordingly iv) all firms can be categorized in certain classes where the expected returns of each firm have the same risk characteristics and v) firms can either issue equity or risk free debt. Under this theoretical framework M&M (1958) argue that the only thing that determines a firm's value is the cash flow from the firms' operating activities. The example the authors provide in order to prove their point considers two firms, a levered and an unlevered one, with the same expected operating cash flows where one of them is overpriced; arbitrage opportunities exist and will be exploited thus bringing into line the value of the two firms.

These arbitrage opportunities exist because investors have the ability to duplicate the firm's corporate actions by borrowing and lending in their own personal accounts, thus rendering corporate financing decisions irrelevant.

Proposition II refers to the cost of equity and stems from proposition I. Proposition I indirectly states that the firm's Weighted Average Cost of Capital (WACC) is independent of its capital structure. Since both firms have the same expected returns, these returns have to be discounted by the same WACC to give equal firm values. Taking under consideration that the WACC is the weighted sum of a firm's cost of debt and cost of equity, M&M reason that, as a firm increases its leverage, and therefore replaces equity with cheaper debt, its cost of equity should increase as well in order to remunerate shareholders for their increased exposure in financial risk and therefore keep the WACC constant.

Proposition III states that the only way to increase a firm's value is to undertake investments whose returns are greater than the firm's WACC.

However, M&M (1958) recognize that their set of restrictions is unrealistic. The authors close their paper stating that their extreme simplifications should be relaxed in order to make more realistic and relevant conclusions. Real world observations indicate capital structure relevance and not irrelevance (Barclay et al., 1995; Myers, 2001). Myers (2001) highlights the constant innovation that is observed in the real world in terms of evolving security designs and new financing schemes. If financing did not matter, there would not be any requirement for innovation.

2.2.3 Capital Structure and taxes

The ''no taxes'' assumption was the first assumption to be lifted as M&M (1963) factored corporate income tax into their analysis. This time the authors argued that debt financing has an advantage because interest expenses are tax deductible. When corporate taxes are taken into consideration, the total cash flows of the firm are received not only by shareholders and debtholders but by the state as well. Increasing leverage and therefore interest expenses reduces the firm's tax base and therefore the cash flow towards the state, while on the same time increasing the total cash flow/return towards creditors and shareholders. In conclusion, these generated tax savings (often referred to as *tax shields*) lead to an increase in a firm's value.

It is important to mention that under this line of reasoning, the optimal capital structure for every firm should utilize as much debt as possible. This way firms would reap the full advantage of the created tax shields. In the real world however, facts show that this is hardly the case. M&M (1963, pp.442) recognizing this empirical shortcoming underlines that:

> *''It may be useful to remind readers once again that the existence of a tax advantage for debt financing, even the larger advantage of the corrected version does not necessarily mean that corporations should at all times seek to use the maximum possible amount of debt in their capital structures.''*

Consequently, the authors provide a few reasons why complete debt finance is unlikely to be utilized and observed. One is that firms often need to preserve financial flexibility for strategic reasons. More specifically, firms maintain an unutilized borrowing capacity, which is ready to be employed when other

sources of financing are unavailable or costly. Another reason mentioned is that lenders often impose limitations on debt financing in order to limit the firms' risk of failure and therefore their risk of losing their capital. Finally, M&M (1963) refer to the effect of the existence of personal income tax. In the presence of investors' personal income tax, retained earnings are sometimes a cheaper financing method.

Another tax related theory that has been hypothesized to affect capital structure choice is the existence of non-debt tax shields. As explained earlier firms can take advantage of the tax deductibility of interest payments and generate tax shields while levering up. However, De Angelo and Masulis (1980) point out that, firms have other ways than debt to reduce their corporate taxes burden. These non-debt tax shields include depreciation, investment tax credits, or loss carry forwards. Therefore, debt and non-debt tax shields can be considered substitutes. As this theory predicts a substitution between tax shields and non-tax shields, a negative relationship between leverage and the existence of non debt tax shields is expected.

Empirical research and survey findings indicate that tax and non-tax shields are determinants of capital structure. Givoly et al. (1992) investigate the effect of the 1986 US Tax Reform Act[3] on US firms capital structure. Their findings indicate that capital structure is determined at least partially by tax and non-tax shields. Specifically, the authors report that firms which lost more non-tax shields increased their leverage more that the others. In addition, their findings show that firms with higher effective tax rates decreased their leverage more than others indicating the importance of corporate tax rates.

[3] The 1986 US Tax reform Act revoked investment tax credits and decreased corporate income tax.

Wald (1999) tests the significance of eight possible determinants of capital structure across five countries (US, UK, Germany, France and Japan) using a Tobit regression. The coefficient of his non-debt tax shield related proxy is negative in all five countries although it is statistically significant only in the US. Results of Shallheim et al. (2006) also support the relevance of non-debt tax shields. Shallheim et al. (2006) utilize a new proxy for non-debt tax shields (tax expense minus interest paid) in their models and find a statistical significant and positive relationship between this proxy and an under-leverage[4] proxy. Therefore, the authors claim that firms often resort to other methods than debt to reduce taxable income.

Responses from financial executives in surveys in Europe and the US indicate that although the tax effects of debt financing are often taken into consideration in the capital structure choice, they are not of prime concern. Nevertheless, Bancel and Mittoo (2004) report that, 58% of firm managers across 16 European countries; describe the ''tax advantage of interest deductibility'' as an ''important or very important'' factor affecting capital structure. The corresponding percentage for the US is 45% according to the survey of Graham and Harvey (2001). Brounen et al. (2005) provide similar results for European firms.

2.2.4 The Trade Off theory of Capital Structure

Since 1963, finance scholars argued that personal taxation and other factors can often offset the tax advantages of debt thus leading to the Trade Off theory. One example is Miller (1977) who argues that personal income tax can

[4] One of Shallheim et al.s' (2006) argument is that the observation that US firms do not hold as much debt as it would be expected taking under consideration a ''rational use of the interest tax deduction'' can be explained by the existence of non tax debt shields.

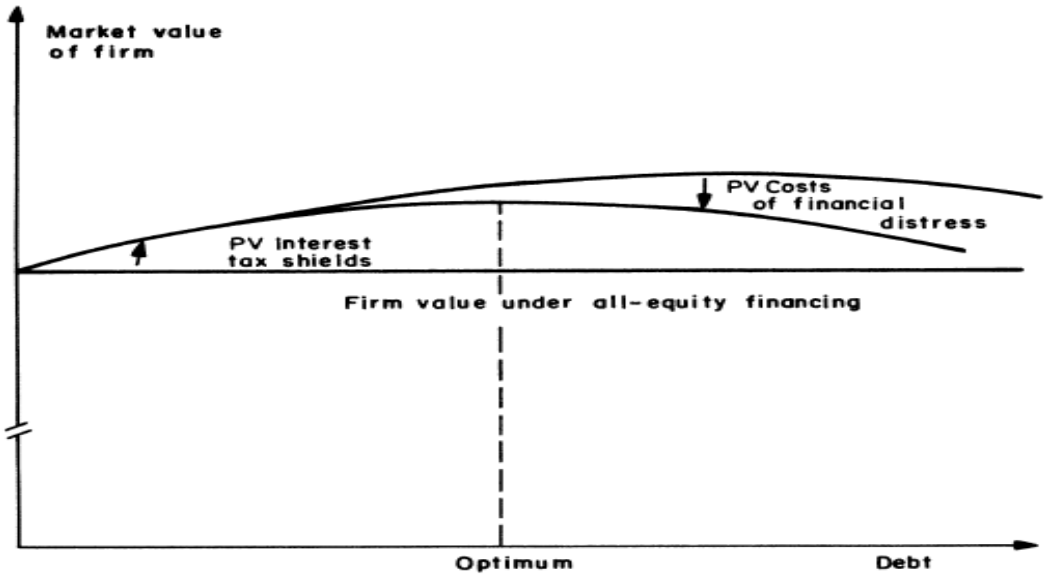
often evaporate the tax shield gains or even turn them into a loss. Specifically, if creditors are taxed on a personal level then more generated income is required to meet the creditors' expected return.

In addition, it has been argued that gearing increases the probability that a firm goes into bankruptcy. More specifically, during fluctuations of its operating cash flows it might not have the ability to make high interest payments and therefore go bankrupt. Vernimmen et al. (2008) explain that bankruptcy carries direct and indirect costs. Direct costs include lawyers' fees, administration costs and redundancy payments. Indirect costs include less trade credit and financing difficulties as well as reduced productivity and order cancellations. Vernimmen et al. (2008) also suggest that a highly geared company in financial distress can lose value because it will not be able to fund profitable investments and R&D. As leverage increases, the marginal costs of debt increase and the marginal benefits of debt decrease.

In summary, Trade Off theory suggests that firms try balance the tax benefits of debt against the various costs of debt and reach an optimal debt ratio when the firm's value is maximized[5]. As long as one additional dollar of debt financing brings more benefits than costs, the firm will continue to lever up. Therefore, at the point where the marginal benefits of debt will equal the marginal costs of debt, the firm will stop levering up and its optimal capital structure will be reached (Myers, 1984). Fig. 1 presents the static Trade Off theory as portrayed by Myers (1984).

[5] Investment is held constant.

Figure 1 Trade Off theory



PV = present value

Source: Myers, S. (1984). The capital structure puzzle. *Journal of Finance, Vol.* 39, Issue 3, p. 577

Trade Off theory implies that there is an optimal capital structure and that any observed deviation from the optimal ratio is only temporary and due to random circumstances.

Miller (1997, pp. 262) does not find the Trade Off model convincing. Specifically he disagrees with the idea that bankruptcy costs can offset debt benefits since they'' *seem disproportionately small relative to the tax savings they are supposedly balancing*''. The author adds as well that the difference between benefits of debt and bankruptcy costs would be especially great in large and low-levered companies. Another argument presented by Miller (1977) is that capital structure in the US has remained relatively stable from the 1920's to the 1950's even though during this period tax rates had quintupled.

The Trade Off theory provides many testable hypotheses about its validity. Profitable firms should carry more debt as they have more income to shield. In

addition, firms with more tangible assets will have increased leverage as they can be used as collateral. Likewise bigger firms are expected to carry more debt. Rajan and Zingales (1995) explain that, bigger firms are usually more diversified, have more stable cash flows and therefore have a lower risk of bankruptcy. Finally, firms with volatile earnings who therefore are more prone to financial distress should carry less debt. Therefore, Trade Off theory predicts that leverage has a positive relation with profitability, size and asset tangibility and a negative relationship with the probability of financial distress.

In general, empirical research has tested all theories of capital structure jointly by including all possible determinants through various proxies in regression models. Results are inconclusive towards the validity of the Trade Off theory. Profitability does not have the predicted sign as the regression results of various studies report (e.g. Rajan and Zingales 1995; Huang and Song 2006; Booth et al. 2001; Bevan and Danbolt 2002; Chen 2004; Huang and Song 2006). However, size, tangibility, and probability of financial distress have the sign predicted by the theory in the findings of Rajan and Zingales (1995), Booth et al. (2001), Wald (1999), Chen (2004), and Huang and Song (2006).

Surveys conducted in European countries and the US have tried to establish, whether firms have a target debt ratio. The responses indicate differences between countries and only limited support for the Trade Off theory. US CFOs' responses to a survey by Graham and Harvey (2001) indicate that while the majority of large firms in the US have a target debt ratio, only less than one third of small US firms have one. Brounen et al. (2005), report that less than 10% of firms in their sample of UK, French, and German and Dutch firms have a strict debt ratio target. In addition, over half of French firms and a third of UK and Germany firms state that they have no target debt ratio. However

more than two thirds of US and Dutch firms state that they aim for some target ratio (''flexible target debt ratio'', '' somewhat strict target debt ratio'', ''strict target debt ratio'' (Brounen et al. (2005), p. 23)

2.2.5 Agency theory, agency costs and free cash flow

According to Jensen and Meckling (1976) the observed behaviour of any organization is the outcome of a complex process. Specifically, it is the outcome of a process, which brings the conflicting interests of all its stakeholders into an equilibrium defined within a framework of contractual relationships. An example of these contractual relationships, are agency relationships where *principals* hire *agents* to act on their behalf. In the case of a corporation, shareholders (principals) hire managers (agents) for their services and by doing so they inevitably pass on a part of their decision-making authority to managers, thus causing a separation of ownership and control. If both shareholders and managers are concerned with maximizing their own benefits, we can assume that the decisions and actions of the latter will not always be on the best interest of the shareholders.

Agency theory analyses the conflicts of interest that arise from agency relationships and their impact on firm value (Jensen, 1986). Finally, Jensen and Meckling (1976) distinguish between two types of agency costs. Agency costs of debt (conflicts of interest of shareholders versus debtholders) and agency costs of equity (conflicts of interest of shareholders versus managers).

Agency costs of debt relate to the wealth expropriation and asset substitution hypothesis. This means that when firms take on debt managers may have an incentive to transfer wealth from bondholders to shareholders by substituting existing assets with riskier ones. To explain this Jensen and Meckling (1976) utilize options theory. The value of shareholders' equity can be viewed as a

European call option with a strike price equal to the value of debt. Since the value of this option increases with the variance of the firm's future cash flows, managers might be tempted to invest in risky projects to increase shareholders wealth. This will have a negative impact on debtholders since it increases their risk and therefore decreases the value of debt as the same fixed cash flow return from their bonds comes under a greater risk. In order to avoid such behaviour creditors often impose restrictive covenants to ensure that the firm will not substitute the existing assets with riskier ones. This limits investment decisions and can therefore lead to opportunity wealth losses.

- The agency costs of debt are more severe when the probability of bankruptcy is high. In such circumstances, creditors' interests can be harmed in various ways by shareholder behaviour. Since shareholders have only their invested capital to loose and are not concerned with operating risk they can choose to invest in high-risk projects in the hope of the high return outcome to occur.
- Underinvesting. If shareholders are expected to contribute to financing a positive NPV project, they might wish not do so if the cash inflows will be utilized to repay creditors.
- Milking the property. Shareholders might sell part of the assets of the company and distribute the proceeds to themselves in the form of dividends.

  Therefore, the firm's creditors acknowledging that such actions might materialize might demand a higher requested return in the form of higher interest.

  Agency costs of equity refer to problems that arise from the conflict of interest between managers and shareholders. The main idea is that as the percentage of outside equity increases the managers' ownership claims decrease and therefore his incentives to increase firm value diminish. In addition, managers

might consume corporate resources to maximize their own pecuniary and non-pecuniary returns, because the cost is shared with shareholders. Prospective minority shareholders will perceive this and will incorporate monitoring costs and the manager's behaviour into the share price that they are willing to pay.

Shareholders incur three types of agency costs according to Jensen and Meckling (1976). Monitoring costs, which stem from the observation of the managerial actions and the attempt to control them (e.g. budget restrictions, compensation methods). Incentive costs when shareholders provide incentives to induce the desired managerial behaviour (e.g. reward or penalize managerial actions). Finally, residual losses represent losses occurring from the deviation between the actions taken by managers and the actions that would maximize shareholders wealth (Jensen and Meckling, 1976).

Jensen (1986) underlines that even though the agency costs of debt have been extensively debated, little or no importance has been given to the benefits of debt. Jensen's (1986) free cash flow theory explains the benefit of taking on debt in the case of firms with substantial free cash flows. Free cash flows are defined as the cash flows in excess of the capital that is required to finance all investment projects, which discounted at WACC have a positive net present value. Jensen's theory claims that the existence of significant free cash flows would cause severe agency costs between shareholders and managers. Managers focus on maximizing their utility by e.g. increasing the resources under their control to increase their growth related compensation. Therefore, they might spend the excess cash flow on low return projects or waste them on managerial perquisites. Shareholders would prefer to see free cash flows returned to them in the form of dividend payments or share repurchases. Jensen's main argument is that in the presence of significant free

cash flows debt can be beneficial because it restricts the resources under the manager's control. Debt poses a very serious and bonding choice because the firm's creditors can make the firm bankrupt if they do not receive their payments. Consequently, when leverage increases, managerial control over the firm's cash flow is reduced, as more of the firm's cash flow is committed to debt repayments. Therefore, debt leads to the decrease of agency costs between managers and shareholders.

Jensen (1986) points out that this disciplinary function of debt would be more applicable to low growth firms with substantial cash flows. In this case, the existence of free cash flows would play an important part as a capital structure determinant. The hypothesis that, firms that generate excess cash tend to overinvest has been empirically researched by Richardson (2006) who claims supportive evidence. However, Graham and Harvey's (2001,2002) extensive surveys of 392 CFOs' financing decisions find no support that free cash flow plays an important role in capital structure decision-making. Perhaps firms choose other ways to reduce resources under managerial control than by distributing cash to shareholders through dividends or share repurchases.

2.2.6 Asymmetric information and the Pecking Order theory

In 1984, Myers presented his Pecking Order theory based on Donaldson's (1961) study. Myers (1984) claims that the Pecking Order theory performs as well as the static Trade Off theory in explaining corporate behaviour. Contrary to the static Trade Off theory, the Pecking Order theory does not imply that firms have an optimal leverage ratio which they seek to maintain. Instead, it is based on the idea that firms prioritize their sources of financing according to their related asymmetric information costs.

The term asymmetric information is used to explain the adverse selection that occurs when the distribution of information about the real quality of a product between a seller and buyer is unbalanced or asymmetric. One of the most cited papers in economic history; Akerloff's (1970) paper ''The Market for Lemons'' discusses information asymmetry. The author explains that because buyers perceive the existence of good quality and bad quality products, and they are not sure which product quality they are buying, they are willing to pay only an average price. This reasoning can be applied in the world of finance where a manager is the seller, the investors the buyers and the product is the firm's financial securities (bonds, hybrid securities, equity). In this framework the sellers named ''insiders'' (e.g. management, major shareholders) know more about the company's risk, value and investment opportunities and therefore have more accurate and therefore superior information than ''outsiders'' (other shareholders) about their product. Therefore, it can be in the interest of insiders not to share their set of information with outsiders. The realization of this informational 'disadvantage' makes investors suspicious about the firm's corporate financing decisions. As a result, investors demand a form of remuneration for this information gap and

therefore demand a higher return for their investment, which leads to a higher cost of capital. In general, investors interpret each financing decision as a signal, which, if not interpreted correctly, can lead to mispricing of the firm's securities. For example, they can interpret a security issue as an offering of overvalued shares.

The Pecking Order theory is a theory based on the assumption of asymmetric information. It initially categorizes sources of financing into internal and external capital. Internal capital refers to cash flows that are being produced by the firm and are not being distributed to shareholders and external capital refers to either issuing debt or equity capital. These two sources of financing bear different costs when viewed under the prism of asymmetric information.

The Pecking Order theory as presented in Myers (1984), and Myers and Malijuf (1984), makes several assumptions: A firm is facing a Net Present Value (NPV) opportunity and the source of financing is equity. There are no transaction costs or other market frictions. In addition, managers know more than investors about the value of their chosen investment project and about the possible under or over valuation of their share price. Management's main concern is the existing shareholders who are passive (they do not rebalance their portfolios in relation to the firms actions). Under this theoretical framework, the existence of asymmetric information can have the following negative impact. Investors might interpret the firm's stock issue as an offer of overvalued stock therefore adjusting the price downwards. Management might choose not to issue equity at a lower undervalued price because doing so they might harm their existing shareholders wealth (if the NPV of the project does not offset the value lost from the price drop). The impact of asymmetric information on this instance is that the firm forewent a positive NPV project.

In general, the Pecking Order theory predicts that the existence of asymmetric information can prevent the allocation of funds to NPV projects and lead to higher costs of capital. Therefore, firms prefer internal over external financing, as internal capital carries no asymmetric information costs. Thus, the observed changes to capital structure are caused by imbalances of internal cash flows relative to investment opportunities and the need for external capital that this imbalance brings.

In addition, Myers (1984) claims that, if internal financing is unavailable and firms need to resort to external financing, then debt is preferred over equity. The reason for this is that debt is less risky than equity and it carries a better signaling content than equity. As Barclay et al. (1995) explain, debt comes with covenants and guarantees, which oblige a firm to make a series of fixed payments. If these payments are not met, serious consequences will occur. Debt is far less forgiving than equity.

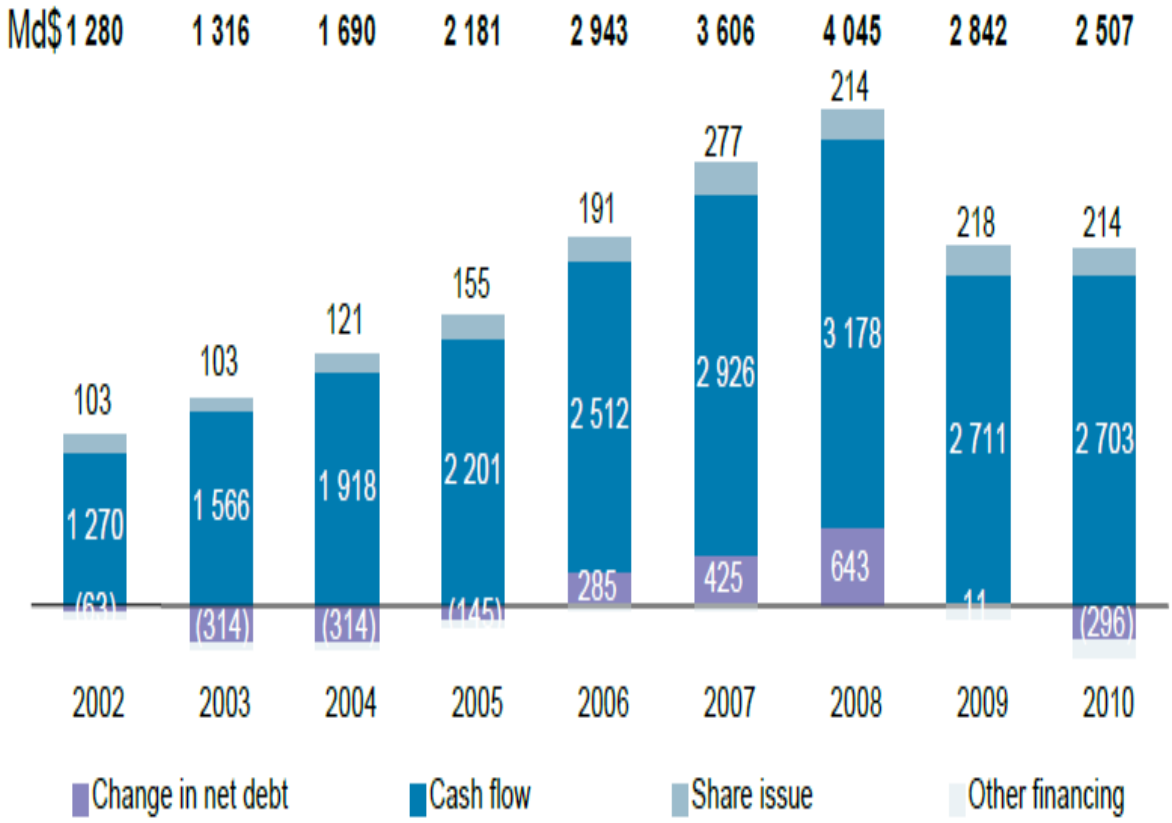
Summarizing, the Pecking Order financing hierarchy as described by Myers (1984):

- Firms prefer internal over external financing. If internal financing is available, firms draw down their cash balances to fund their investment opportunities. Firms may even adjust their dividend payout in order to utilize internal financing.
- Considering cash flow fluctuations and the ''stickiness'' of dividends, firms might have to resort to external financing. First, they issue the less risky security. Therefore, debt comes first followed by hybrid securities, the last resort being equity.

Myers (1984, pp.582) supports his theory by reporting that ''For all non-financial corporations over the decade 1973-1982, internally generated cash

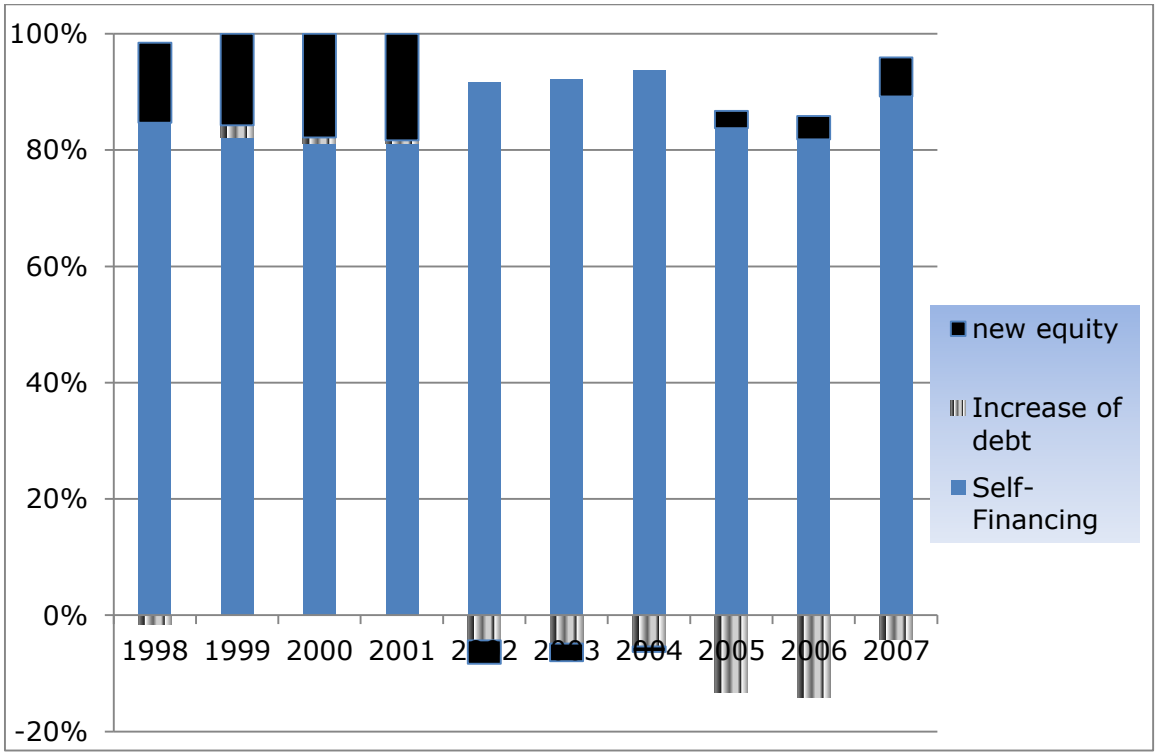
covered, on average, 62 percent of capital expenditures, including investment in inventory and other current assets. The bulk of required external financing came from borrowing. Net new stock issues were never more than 6 percent of external financing''. In addition, a look at more recent descriptive statistics provided by Vernimmen (2008) indicates the validity of the Pecking Order theory. This can be seen in Figures 2 and 3. Internal capital is the dominant source of financing for the 2002 – 2010 for a sample of the top 1,200 market capitalizations worldwide. In addition, during the period 1998 – 2006 firms were mainly financed with internal capital (an average of 80%). Because internal capital was not sufficient to fund investment opportunities external capital was utilized. The external capital used was mostly debt rather than equity. In addition, Baskin (1989) observes that many studies have identified a sharp decrease in share price after an equity issue announcement, which he believes can be explained by information asymmetries.

Figure 2 Sources of funds for the 1,200 top market capitalizations worldwide for 2002- 2010



Source: Vernimmen (2012), Newsletter No.61 {available online}, (accessed 7th January 2012), available at: < http://vernimmen.com/html/letter/articles-statistics.php>

Figure 3 Source of Finance of 247 Multinational Enterprises



Source: Vernimmen 2008, p. 703

However, the Pecking Order theory cannot fully explain corporate behaviour. Myers (1984) provides some empirical shortcomings against his own theory. His first example is that the Pecking Order theory cannot fully explain reality, as there are cases when equity was issued when debt financing was available. In addition, there are studies, which indicate *market timing of security issues.* Alti (2006) reports that numerous studies provide convincing evidence that firms issue stock when the cost of equity capital appears low and security prices are ''high''.

The Pecking Order theory translates into the empirical hypothesis that firms, which exhibit high debt ratios, must have internal capital deficits. Likewise, highly profitable firms would exhibit low leverage. Empirical research results regarding Pecking Order theory are contradicting and do not provide a clear

answer. Shyam-Sunder and Myers (1999), suggest that if firms respond to internal capital shortages with debt then the regression of the firm's debt on the internal financing deficit will be close to one. The authors argue that their results are supportive of the Pecking Order theory especially in the case of mature firms. In the case of small or growth firms however, the results are not supportive of Pecking Order theory (Frank and Goyal, 2003). This makes sense as small start up or growth firms do not generate enough internal cash flows to fund their investment therefore this deficit would be even greater.

Frank and Goyal (2003) claim that in the Shyam-Sunder and Myers (1999) model the financing deficit is considered exogenous. Because the financing deficit's components are most likely to be endogenous, the model is likely misspecified.

Fama and French (2005) observe large equity issues from firms that are not in financial distress, which contradicts the Pecking Order theory. Supportive are the Lemon and Zender's (2004) findings. However, their model is based on a modified Pecking Order theory model that includes debt capacity. Finally, Leary and Roberts (2010) research suggests that the Pecking Order theory alone is not sufficient to explain corporate behaviour and that when factors from alternative theories are incorporated to their models their explanatory power increases drastically.

Qualitative studies as in Graham and Harvey (2001), Bancel and Mittoo (2004) and Brounen et al. (2005), have found weak or no support for the Pecking Order theory. The above studies survey a large number of CFO's from US and European countries. The need to preserve financial flexibility has been identified by the majority of CFO's in all countries as one of the most significant issues related to the capital structure choice. Even though the

notion of financial flexibility is related to the Pecking Order theory, Brounen et al. (2005) report that their findings indicate that the need to preserve financial flexibility is not related to the Pecking Order theory. Similarly, Graham and Harvey (2001) state that their results do not provide evidence in support of the Pecking Order financing hierarchy.

The results of quantitative studies into the validity of the Pecking Order theory do not provide conclusive results. Pecking Order theory mainly has been tested through the incorporation of profitability and growth opportunity proxies in various regression models where leverage was the dependent variable. Pecking Order theory predicts a negative relationship between leverage ratios and profitability and a positive one between leverage and growth opportunities. Supportive to the Pecking Order theory, negative relationships between leverage and profitability have been found by the majority of studies as in Titman and Wessels (1998) Friend and Lang (1998), Rajan and Zingales (1995), Huang and Song, Booth et al. (2001), Bevan and Danbolt (2002), Chen (2004), Huang et Song (2006). However growth opportunities are found to be positively related to debt in Wald (1999) and negatively in Rajan and Zingales (1995), Booth et al. (2001) and Huang and Song (2006).

2.2.7 Summary and Discussion

This section has portrayed the most influential capital structure theories, namely Trade Off theory, the Pecking Order theory and agency costs theory. In addition, it has presented the most related and significant survey based research and quantitative studies. It seems that both qualitative and quantitative research so far, have produced contradicting results. For example, managerial responses from several countries provide moderate support for two opposing theories, the Pecking Order and the Trade Off theories. Quantitative

studies also give inconclusive results (see Table 2). Furthermore, some theories succeed in explaining some aspect of corporate financing behaviour but fail to do so in others. As an example, the Pecking Order theory succeeds in explaining why large profitable firms operate under low debt ratios while it fails to explain why firms, which are able to issue debt sometimes, issue equity.

The failure of capital structure related research to provide clear and convincing evidence may lay in the fact that capital structure policy has been investigated mostly in isolation from other significant corporate financial decisions such as dividend policy (Faulkender et al. 2006; Aggarwan and Kyaw 2010). The authors support that payout policy and capital structure policy are interrelated. More specifically, the Pecking Order theory of Myers (1984) links capital structure and dividend policy as it hypothesizes that firms adjust their dividend payments while taking under consideration retained earnings and investment opportunities. The capital structure and dividend policy are also related under an agency framework. Debt and dividends can both be used as substitutes in order to reduce agency costs by reducing resources under managerial control. In addition, as we shall see in the next sections, most of the factors that have been found to influence capital structure have been found to influence payout policy as well (dividends and share repurchases). The majority of research regarding capital structure does not account for this interdependence and therefore it is highly probable that the developed models are misspecified and suffer from endogeneity problems (Aggarwan and Kyaw, 2010).

This study attempts to remedy this by choosing a more appropriate system of equations. More specifically, the inclusion of share repurchases as an endogenous variable into the investigation of the relationship between firms'

dividend payout policies and capital structure will reduce at the very least problems of omitted variable bias, which is expected to be present in previous research on this topic.

Table 2 Capital Structure Determinants

Determinants	Predicted sign	Empirical findings by previous studies
Profitability	**+**: trade-off -: Pecking Order	**-**:Titman and Wessels (1998) Friend and Lang (1998),Rajan and Zingales (1995) ,Huang and Song, Voulgaris et al. (2002),Booth et al. (2001),Chen (2004), Huang et Song (2006) Bevan and Danbolt (2002)
Size	+:trade-off	**+**: Rajan and Zingales (1995),Booth et al. (2001),Wald (1999), Daskalakis et Psilaki (2008), Voulgaris et al. (2002)
Tangibility	**+**:trade-off, Pecking Order	**+**: Rajan and Zingales, (1995),Voulgaris et al. (2002), Chen (2004), Huang and Song (2006)
Growth opportunities	+:Pecking Order -: trade-off, agency costs	**+**: Michaelas (1991),Wald (1999) **-**: Rajan and Zingales (1995), Booth et al. (2001),Huang and Song (2006)
Propability of financial distress	-:trade-off	**-**: Booth et al. (2001),Chen (2004), and Bradley et al. (1983)

2.3 Payout policy

2.3.1 Introduction

Payout policy refers to two important decisions that a firm's management has to make. First it must decide how much cash it will distribute to its' shareholders. Secondly, it has to decide the form of this payout. As Allen and Michaely (2003) point out, the most common form of payout is cash dividends. In general, cash dividends tend to have a recurrent and regular nature.

However, firms sometimes make one-off payments in the form of special designed dividends. Moreover, there are cases where firms decide to pay dividends in the form of stocks (stock dividends).

As with the case of capital structure, payout policy has been extensively researched in relation to the firm's value. Is there a form of payout that maximizes firm value? Are firms that pay dividends worth more than firms who do not? Recent researchers focus mainly on dividends and share repurchases since these are the most predominant forms of payout. As various studies report, dividends have been historically the most common form of payout (Allen and Michaely 2002; De Angelo et al. 2008; Dhanani and Roberts 2009) and repurchases gained increasing popularity after the 1980's (Table 3).

Table 3 The use of Dutch Auctions, Tender Offers and Open Marker Share Repurchases through time

	Dutch Auctions			Tender Offers			Open Market	
	Cases	Dollars (millions)		Cases	Dollars (millions)		Cases	Dollars (millions)
1980	-	-	1980	1	5	1980	86	1,429
1981	-	-	1981	44	1,329	1981	95	3,013
1982	-	-	1982	40	1,164	1982	129	3,112
1983	-	-	1983	40	1,352	1983	53	2,278
1984	1	9	1984	67	10,517	1984	236	14,910
1985	6	1,123	1985	36	13,352	1985	159	22,786
1986	11	2,332	1986	20	5,492	1986	219	28,417
1987	9	1,502	1987	42	4,764	1987*	132	34,787
1988	21	7,695	1988	32	3,826	1988	276	33,150
1989	22	5,044	1989	49	1,939	1989	499	62,873
1990	10	1,933	1990	41	3,463	1990	778	39,733
1991	4	739	1991	51	4,715	1991	282	16,139
1992	7	1,638	1992	37	1,488	1992	447	32,635
1993	5	1,291	1993	51	1,094	1993	461	35,000
1994	10	925	1994	52	2,796	1994	824	71,036
1995	8	969	1995	40	542	1995	851	81,591
1996	22	2,774	1996	37	2,562	1996	1,111	157,917
1997	30	5,442	1997	35	2,552	1997	967	163,688
1998	20	2,640	1998	13	4,364	1998	1,537	215,012
1999	19	3,817	1999	21	1,790	1999	1,212	137,015

Source: Grullon, G. and Ikenberry, D.L. (2000). What do we know about stock repurchases? *Journal of Applied Corporate Finance,* Vol. 13, Issue 1, p. 33

2.4 Dividend Policy

2.4.1 The Dividend Irrelevance theory

As with capital structure, one of the most well known papers regarding dividend policy belongs to Modigliani and Miller. Similarly, to the ''capital structure irrelevance theorem'' M&M developed the ''Dividend Irrelevance theorem''. Their reasoning remains the same in both cases. Value cannot be created just by a financial decision. A firm can only increase its value by choosing the right investment projects and by its operations. In the authors' own words.

> *''Values are determined solely by 'real' considerations- in this case the earning power of the firm's assets and its investment policy-and not by how the fruits of the earning power are 'packaged' for distribution''* (M&M, 1961, pp. 414).

Modigliani and Miller (1961) suggest that dividend policy does not affect firm value. They assume that shareholders are indifferent between dividends and reinvestment of earnings. In the first case, shareholders receive cash but the share price will drop. In the second case, shareholders will realize capital gains from the reinvestment of earnings, if the firm is earning its expected return. As Black (1976) explains, if investors receive a dividend per share the share price will drop on the ex dividend date by about the amount of the dividend. This is because the amount of dividend paid per share causes the entire range of possible stock prices to drop by that amount.

Gordon (1962) counter argued M&Ms' Dividend Irrelevance proposition. Gordon (1962) suggested that investors are not indifferent between dividends and capital gains because of the greater risk that the latter encompasses.

Investors, according to Gordon, prefer receiving dividends now than being exposed to the risk that the capital gains that would occur in the future from the undistributed dividends reinvestment will not materialize. Therefore, investors will be willing to pay a higher price for companies with high dividend ratios. This rationale is usually referred to as the Bird in the Hand theory.

Another counter argument to M&Ms' contention is that it is based on the unreal ''perfect capital markets'' assumption. In perfect capital markets, there are no transaction costs, brokerage fees and dividends and capital gains have the same tax treatment. As in the case of the ''capital structure irrelevance theorem'' the importance of the dividend irrelevance theorem is that it indicates why under real world conditions payout policy matters. For example, Allen and Michaely (2003) argue that the existence of tax differentials between dividends and share repurchases makes payout policy relevant. If capital gains are less heavily taxed then they dominate dividends.

Another argument against M&M's ''Dividend irrelevance theorem'' is that the variability in the use of certain forms of payouts as well as the evolution in their design indicates that payout policy is relevant. For example, in 1996 in the UK, investment banks frequently utilized the agency buyback, a form of open market repurchase because of its tax ''appeal'' to pension funds (Rau and Vermaelen, 2002). However, as reported by the authors this tax loophole was detected later by the tax authorities and was abolished. Vernimmen et al. (2008) provide another paradigm that indicates the continuous adaptation of payout policy to economic factors. They report that the practice to pay dividends in shares appears to be making a comeback in 2008, as firms might want to preserve their cash reserves during the financial crisis.

Black and Scholes (1974) tested the irrelevance theory empirically. The authors created 25 portfolios varying from low dividend yield portfolios to high dividend yield portfolios and low to high betas. However, the authors did not find any significant results that expected returns on low yield portfolios differed from high yield portfolios.

So far, the dividend literature has mainly focused on the no taxes, the no asymmetric information and the no agency cost assumptions of M&M dividend irrelevance theorem thus giving rise to tax, tax clientele and signaling theories.

2.4.2 Dividends and taxes

The ''Dividend Irrelevance Theorem'' assumption that dividends and capital gains have the same tax treatment is rather unrealistic. Vernimmen et al. (2008) report that, in most countries dividends are taxed more heavily than capital gains. For example in the US, dividends are taxed once on corporate level by the corporate income tax and twice on investor level by the personal tax of each shareholder. This suggested tax advantage of capital gains implies that the optimal policy is not to pay dividends at all. However, historically, a significant percentage of firms has been paying dividends and continues to do so. In the US, Fama and French (2001) report that during the 1978 to 1999 period the percentage of dividend paying firms ranged from 67% to 21%[6]. The explanation to this paradox according to Allen and Michaely (2003) is that not all investors are taxed as individuals and that some institutions find it hard to invest in low dividend paying stock due to legal restrictions.

[6] Fama and French (2001) argue that the decline in the percentage of dividend paying firms in recent years can be attributed to the increase in appearance of growth firms. Such newly established firms are characterized during their early phases by large investment opportunities and low profitability do not pay dividends.

More specifically, the authors explain that a firm's shares can be held by various entities like individuals, pension funds and other corporations. All these types of investors are taxed differently regarding their dividend income. In the US, pension funds do not pay taxes on dividends and therefore are indifferent between capital gains and dividends. In addition, corporations, which own dividend-paying stocks, are required to pay tax only at a certain percentage of the dividends they receive[7]. The fact that a company's shares are held by different investor groups, which incur different tax treatment, gave rise to the *Clientele theory.* Clientele theory argues that investors will invest in companies that have a dividend policy that matches their preferences. Therefore, the theory predicts that individuals will hold low dividend paying stocks while medium dividend paying stocks will be held by tax-free institutions. Finally, corporations will hold high dividend paying stocks. It is important to add that as Allen and Michaely (2003) mention institutional investors (e.g. pension funds, insurance companies, commercial banks) are restricted by the *prudent man's rule*[8] to invest in no or low dividend paying stocks. The legal regime and its influence on institutional investors can affect dividend policy considering the size of institutional investor holdings. For example, according to Brav and Heaton (1998) during 1964 -1988 institutional investors held an average of 36.5 % of US equities. A 34.4 % average of these shareholdings was held by private pension funds subject to the prudent man's

[7] ''Before the 1986 Tax Reform Act (TRA), a corporation that held the stock of another corporation paid taxes on only 15% of the dividend. Therefore, the effective tax rate for dividend income was 0.15 x 0.46 = 0.069. After the TRA, the corporation income tax rate was reduced to 34%. The fraction of the dividend exempted from taxes was also reduced to 70%. The effective tax rate for dividend income was therefore increased to 0.3 x 0.34 = 0.102. In both time periods, the dividend exemption could be as high as 100% if the dividend-paying corporation was a wholly owned subsidiary of the dividend-receiving corporation.'' (Allen and Michaely 2002, p. 24)

[8] Brav and Heaton (1998) report that the Employee Retirement Income Security Act of 1974 (ERISA) subjected private pension funds to a more strict "prudent man" rule. In addition, the US case law approved prudent investments as investments that paid steady dividends. Therefore the investment of pension funds seems to be guided to the direction of medium or high dividend paying firms.

rule. Moreover, Davis (2002) states that, the average percentage of the equity held by domestic institutional investors is 30-40% for the US and the UK.

Empirical research findings as well anecdotal observations and surveys provide moderate support about the impact of taxes and the existence of clienteles on dividend policy. Allen and Michaely (2003), underline that their findings show that for the last 30 years, the percentage of dividend payments that individuals in high tax brackets receive, keeps increasing. This observation is the exact opposite of to what the clientele theory and tax disadvantage of dividends predict. However, an explanation may be provided by the existence of risk aversion. Risk aversion may stop individuals in high tax brackets to position themselves completely in low dividend paying firms. Such firms will be favored but not at the exclusion of all other potential investments. Barclay et al. (2009) find evidence contrary to the tax clientele hypothesis. According to their observation dividends do not increase after a large percentage block of stock trade from individuals to corporations takes place. On the contrary supportive are the evidence of Elton and Gruber (1970), Brav and Heaton (1988). Elton and Gruber's (1970) findings indicate that drop off ratios are positively correlated with dividend yield. The authors interpret this as high tax investors selling their high dividend paying stocks and purchasing low dividend yield stocks. Their finding seems consistent to the tax clientele theory. Also, supportive to the tax clientele theory seems the finding of Brav and Heaton (1988) who report that firms who omit dividends lose their institutional investors; this loss is permanent if the firm does not reinitiate dividends. Finally, a recent study regarding the May 2003 dividend tax cut by Blouin et al. (2011) indicates that taxes do affect payout policy and that tax clienteles exist.

The May 2003 dividend tax cut in the US can be considered as a ''natural experiment'' (as described by Chetty and Saez, 2006), that provided valuable insight on the impact of taxes on dividend policy and the existence of tax clienteles. At that time, the tax rate for retail investors in the US decreased significantly[9]. Chetty and Saez (2006) state that the tax cut resulted in a 20% increase in dividend payments and in a large number of dividend initiations. In addition, their results show that firms with nontaxable institutional ownership did not alter their policy after the tax cut. Blouin et al. (2004) also document a large increase in dividends initiations. Furthermore, Blouin et al. (2011) study presents evidence that after the 2003 tax cut individuals rebalanced their portfolios to maximize their after tax returns as well as evidence that firms with a large percentage of individual shareholders increased their dividend payments. The above findings seem consistent with the tax clientele theory and indicate a change in corporate behaviour caused by the tax cut. However, Julio and Ikenberry (2004) argue that an increase in aggregate dividend payments was documented in late 2000; therefore, the post 2003 tax cut dividend payment increase may not be fully attributable to tax effects. Chetty and Saez (2006) disagree with this view and claim that the 2000 increase in dividends is due to the dot.com bubble bust resulting in non-dividend paying high tech stocks disappearing from the utilized top 1000 sample.

Surveys on managerial views regarding dividend policy give moderate support to tax considerations. More specifically Brav et al. (2007) surveyed managerial responses to the 2003 US tax cut. Responses indicate that the indeed the tax played a role in the following dividend increases and consideration but its

[9] ''The top statutory tax rate on dividend income dropped from more than 38% to 15% and the top rate on capital gains declined from 20% to 15%'' (Brav et al., 2007)

effect was of a second hand order. Brav et al. (2007) explain that managers identified other factors to be more significant payout determinants and suggest that firms who initiated or increased dividends were ''on the fence'' to do so before the tax cut. The second order importance of tax considerations and of the clientele theory are also supported by US and European financial executives responses in the surveys of Bancel et al. (2005) and Brav et al. (2007). The percentage of financial executives that rate ''the personal taxes of my shareholders when receiving dividends'' as ''important or very important'' factor affecting dividend policy is around 21% in both the US and Europe. More value seems placed upon the ''attracting institutional shareholders'' factors. This factor is highlighted as ''important or very important'' from 50% of European managers and by 32% - 50% of US ones, (Bancel et al. 2005; Brav et al. 2007)

In general, research so far seems to indicate that tax and clientele considerations affect dividend policy but are of second order importance when compared to other payout policy determinants.

2.4.3 Information asymmetries and signaling theories

Information asymmetries between managers and the capital markets are another possible cause of market imperfection. Managers know more about their company's value and earnings prospects than investors do. Therefore, they can perceive if their company's share is fairly valued by the market. If the managers' belief is that their stock is undervalued, they can signal this to the market through a dividend increase. Dividend policy can be utilized to send a more effective and credible signal of good future prospects when compared to other forms of financial information. For example, Vernimmen et al. (2008)

mention that financial information that investors receive from companies are usually biased. Companies tend to ''window dress'' their results through manipulative accounting and selective disclosures in order to present their company in the best possible way. Such practices are available to all firms therefore undervalued firms must find a credible and effective way to signal their mispricing. Signaling theory supports that dividend policy can be utilized as an effective form of communication that can signal the firms mispricing to the market and the reason for this is the associated cost (Allen and Michaely, 2003). For example, a dividend increase can be interpreted as a good sign by investors. It is known, that capital markets punish dividend reductions with share price reductions. Thus managers would not risk increase the dividend payments if it they did not have solid information about future earnings realization and therefore their ability to maintain the increased level of dividend payments. If their expectations do not come true, dividend payments would have to be decreased and the company would suffer the market punishment[10]. Hence, a dividend increase can prove costly.

Empirical research has tested the signaling theory of dividends mostly in two ways. The first way was to investigate if unanticipated changes in dividend payments cause stock price changes in the same direction. The second was to test if dividend changes are followed by changes of earnings in the same direction. Allen and Michaely (2003) state that empirical research agrees in the following three findings: i) Dividend changes cause share prices to move in the same direction, ii) there is a relationship between the immediate price reaction and the magnitude of the dividend change. iii) Decreases in share price after a

[10] Empirical evidence show that capital markets punish dividend reductions with share price reductions (Benartzi et al. 1997; Allen and Michaely 2003)

dividend decrease announcement are larger than increases in share price after a dividend increase announcement. The above empirical findings seem consistent with signaling theory. However, Allen and Michaely (2003) note that the above findings are necessary for the signaling theory to be valid but not sufficient. The authors mention that the most basic condition for signaling theory to be valid is that changes in earnings follow the changes in dividends. Grullon et al. (2002b) support the same. Grullon et al. (2002b) claim that empirical research into the relationship between dividend changes and future earnings reports is not supportive of the signaling theory. One of the examples mentioned is the study of Benartzi et al. (1997). Benartzi et al. (1997) findings show that the earnings' growth rates of firms do not increase after an increase in dividends. In addition, earnings growth rates significantly increase in firms that decrease their dividends. Grullon et al. (2002), reason that stock price increases after dividend increases show that investors perceive such changes as positive. But empirical findings support that this perception is not owed to earnings expectations. Therefore, Grullon et al. (2002b) test the hypothesis that firms who increase their dividend experience a significant decline in systematic risk. Their findings are supportive of this and hence they argue that the decline in systematic risk leads to a decrease in the firms' cost of capital, which explains the positive stock price reactions.

The "costly signal'' aspect of the signaling theory has been also empirically researched. Signaling theory implies that as the signal gets more costly, the information signaled becomes more reliable (Bernheim and Wantz 1995). Under this reasoning, increasing dividends is more costly when taxes on dividends are higher than capital gains. Therefore share price reactions to given dividend changes should be more positive in periods when dividends are

more tax disadvantaged. Findings do not point to a clear direction. In Germany where dividends are taxed less than capital gains Amihud and Murgia (1997) find that dividend changes lead to changes in the stock price in the same direction. This contradicts the notion that a signal has to be costly to convey information but shows that dividend changes in the German law frame remain informative possible for other factors. Amihud and Murgia (1997) support Black's (1976) argument that dividends might still convey information because of the managers are not keen in reducing dividends and only raise them when they believe they can be sustained. Alternatively, as Bhattacharya (1979) notes if an increase in dividends will not be supported by future earnings a firm will have to resort to costly external financing to fund its investment. On the other hand, Bernheim and Wantz (1995) results for a sample of US firms are supportive of the signaling theory. Bernheim and Wantz (1995) use regression analysis to investigate the hypothesis that an increase in dividend taxation should increase the per share market response per dollar of dividend change. Their results support this hypothesis and therefore signaling theory.

Finally, surveys on European and US CFO's by Bancel et al. (2005) and Brav et al. (2003) respectively, show moderate support for signaling reasons as a basic payout policy determinant. More specifically Brav et al. (2003), underline that managers clearly rejected the idea that they pay dividends as a costly signal to indicate their firm's true value or to separate their firm from rest. However, they believe that dividends do have an informational content.

It seems that dividends do carry an informational content to investors because empirical research agrees that dividend changes are followed by share price

reactions in the same direction. However, managerial views reject signaling motives affecting dividend policy. The abovementioned informational content of dividend changes and its impact on share prices might be explained by the agency theory of dividends, which is described in the following section.

2.4.4 Agency theory, free cash flow and dividends

The agency theory as described in the capital structure section can be linked to dividend policy. Easterbrook (1984) supports that, ''logically any dividend policy (or any other corporate policy) should be designed to minimize the sum of capital, agency, and taxation costs''. The author provides two explanation of why dividends are paid. As he explains, agency costs arise from two issues. First, as the agency theory of Jensen and Meckling (1976) supports, the interests of managers and shareholders often diverge. Therefore, shareholders incur monitoring costs to observe if the behaviour of managers is in accordance with their interests. In addition, managers' behaviour can be characterized by risk aversion. They will tend to choose low risk low return projects in order to feel safe and keep their position[11]. This is contrary to the shareholders' interest. Shareholders would prefer investment in riskier more profitable projects as these increase their wealth. Dividends according to Easterbrook (1984) can reduce monitoring costs as their payment causes managerial behaviour more similar to the preferences of shareholders.

If a firm pays dividends to its shareholders, then the likelihood that it will need external financing to fund investments increases. The resources under managerial control decrease and therefore the firm will be more likely to sell shares to the capital markets. This will have the following effect. First, the firm

[11] Shareholders hold more diversified portfolios in comparison to managers whose wealth is related more to their firms' success. Therefore shareholders have limited risk exposure to a single firm's actions than managers.

will incur the strict monitoring of capital markets (e.g. investment bankers). Since dividends reductions are punished by the capital markets, managers will perceive that they will have to resort to external financing more frequently. Under the more intense monitoring of the market, managerial behaviour will be more closely aligned to the shareholders interest. They will have to become more efficient and focus on maximizing firm and shareholders' wealth.

According to Jensen (1986), the agency costs above are more severe in companies with significant free cash flows. The need to minimize cash under managerial control in this case is greater. This could be done in the form of higher payouts to shareholders. However, Jensen (1986) supports that debt (without retention of the issue) would be more efficient in such cases. Debt forces managers to make interest payments or face bankruptcy. On the other hand dividends payments can be reduced.

The main testable hypothesis of the agency and free cash flow theory is that firms with excess cash flows should pay more dividends. In general, empirical research findings support this hypothesis. La Porta et al. (2000) study the relationship between investor protection in various countries and the level of dividend payout. They find that in countries with better minority shareholder protection (e.g. countries where investors have the right to vote on the election of managers or vote on other significant firm issues, the right to take legal action against the company) firms generally pay more dividends. In line with agency theory, this indicates that minority shareholders are able to force managers to disgorge cash and thereby protecting their investment by insiders (managers and large shareholders) expropriation. Also in line with agency theory are the findings of DeAngelo et al. (2004). The authors utilize

qualitative response models and find a statistically significant relationship between high-earned equity ratios and the decision to pay dividends for a sample of US firms. Denis and Osobov (2008) report similar findings for their sample of six G-20 countries (US, UK, France, Germany, Canada and Japan). However, both Denis and Osobov (2008) and DeAngelo et al. (2004) observe that larger firms are more likely to pay dividends. In accordance with this De Angelo et al. (2004, pp. 1) argue that:

''Had they not paid dividends, the 25 largest long-standing 2002 dividend payers would have cash holdings of $1.8 trillion (51% of total assets), up from $160 billion (6% of assets), and $1.2 trillion in excess of their collective $600 billion in long-term debt. Their dividend payments prevented significant agency problems since the retention of earnings would have given managers command over an additional $1.6 trillion without access to better investment opportunities and with no additional monitoring''

Similar are also the results of Brav et al. (2003). Their survey of managers underlines the importance of agency theoretical considerations for dividend decisions in firms with very high free cash flows (''cash cows''[12]).

However, by contrast, Baker et al.'s (2002) survey of NASDAQ firm managers finds weak to little support for agency theoretical considerations as a determinant of dividend policy. However, their questionnaire does not include a question on excess cash flow and merely asks managers if dividend payments align their interests with those of shareholders and if they force a firm to seek external financing subjecting it to market scrutiny.

[12] Brav et al. (2003), name ''cash cows'' profitable firms with high credit ratings and low investment opportunities. Such firms are expected to generate significant excess cash flows.

On balance, agency theory seems to be supported by research based on both firm behaviour and managerial opinion surveys. As Allen and Michaely (2003) note, agency theory could provide an explanation of why the markets react positively to a dividend increase. The market might perceive that dividend payments will lead to a decrease of agency costs.

2.4.5 Dividend Smoothing

Dividend smoothing is not a theory but an important empirical observation regarding dividend policy of Lintner's (1956) study. Lintner found that the most important determinant of a firm dividends policy is its earnings. Lintner argues that management's decision-making is based on earnings because they consist are a simple indicator which is widely communicated in the press and thoroughly observed by shareholders. In addition, firms have a target payout ratio to which they progressively gradually adapt. Lintner (1956) also argues that his field observations show that managers believe that shareholders place a premium at the stability and consistency that this kind of dividend policy conveys. In addition, the author underlines the reluctance of managers to reduce dividends.

Lintner reports that, his model[13] was able to explain 85% of the dividend changes in his sample. Fama and Babiak (1968) test Lintner's model and find that it also performed well from 1946 to 1964. Allen and Michaely (2003) underline that empirical studies in general have found Lintner's model to perform well over the years, while Leary and Michaely (2008) note that dividend smoothing is one of most pronounced and well-documented corporate

[13]Lintner's model as presented by Allen and Michaely (2002): For firm i, $D^*_{it} = \alpha_i E_{it}$, $D_t - D_{t-1} = a_i + c_i(D^*_{it} - D_{i(t-1)}) + u_{it}$, (3) where for firm i D^*_{it} = desired dividend payment during period t, D_{it} = actual dividend payment during period t , α_i = target payout ratio, E_{it} = earnings of the firm during period t, a_i = a constant relating to dividend growth, c_i = partial adjustment factor, u_{it} = error term

finance phenomena. However, managerial views as documented by the surveys of Brav et al. (2005) and Bancel et al. (2005) in US and 16 European countries are not completely in accordance with Lintner's findings. Both surveys report that managers agree that they are reluctant to cut dividends and they smooth dividends. Then again, they disagree that they have a target payout ratio as a key and unique driver of their decisions.

The corporate behaviour that dividend smoothing describes strengthens the hypothesis that dividends carry an information content. The reluctance of managers to cut dividends indicates that they are aware of the negative market interpretation of such an action and the impact on the share price. In addition, the relative stability that this corporate behaviour causes can also be considered supportive to the clientele hypothesis. By keeping a relatively stable policy, firms might want to attract a certain type of investor group.

2.5 Share Repurchase Policy

2.5.1 Signaling hypothesis

Many researchers have placed repurchases into an asymmetric information framework in order to explain the increasing popularity of this form of payout. Asymmetric information about the company's prospects between insiders and investors can lead to adverse selection problems in the capital markets. Therefore, in order to mitigate this problem, repurchases can be used as signaling method, which conveys positive information to the market. It is important to underline that there are two versions of the signaling hypothesis something, which is often overlooked in relevant debates, (Grullon and Ikkenberry, 2000). As Baker et al. (2003) explain the first is that firms know more about the firm's prospects and they want to convince the market about

this by sending a costly signal. The second one is that management believes that the share price is mispriced when existing public information are taken under consideration. Therefore, firms might use repurchases as a mean to signal future prospects and/or this mispricing to the market. Since repurchases carry a certain cost the signal should be interpreted as valid. However, it is important to note that open market repurchase announcements (the most dominant form of payout) as a signal are less costly than dividends or fixed price tender offers. Open market repurchase announcements are not a commitment to the firm and they are not accompanied by large premiums as fixed price tender offers. This is a first counterargument to the explanatory power of signaling theory when utilized to explain repurchases.

Many researchers have tested the signaling hypothesis by examining the share price reaction to share repurchase announcements and to actual repurchases. The largest part of empirical studies has focused on the US market. However, studies regarding other countries such as the UK, Germany and China report similar results to the US. In general studies of this nature seem to agree that repurchase announcements have positive impact on the share price. Comment and Jarrell (1991) document positive excess stock returns on the announcement day for all three types of repurchase (open market, tender offers and Dutch Auctions). In the case of Germany, Seifert and Stehle (2003) observe significant positive returns on the announcement day for German firms. In the UK market Lasfer (2000), Oswald and Young (2004) and Hjelmstad et al. (2006) confirm positive market reaction on the announcement day. Specifically, Oswald and Young (2004) find an almost 2% abnormal return over the 11 day window centered on the announcement day which as they explain is similar to US findings from other studies. Similar results of a

1.64 % increase over the 5 day period {-2, +2} are reported by Lasfer (2000). Actual share repurchases seem to be also followed by positive share price reactions. Zhang (2002) reports positive but low abnormal returns after the actual repurchase and Wang et al. (2009) observe a similar reaction for a sample of UK firms. If repurchases are used to convey information to the market or signal undervaluation then the above findings are consistent with this as they report positive share price reactions. In addition, it is important to mention that most of the abovementioned studies find statistically significant negative abnormal returns up to the announcement day, which is an indication of an undervaluation motive. However, as in the case with dividends, the positive reaction of the stock market to a repurchase announcement gives validity to the first version of the signaling theory only if the repurchase is followed by an increase of the firms operating performance. If indeed repurchases are used to signal future prospects then operating performance should be observed to increase. Grullon and Ikkenberry (2000), report that earnings improvement was found only by studies investigating fixed price tender offers. The authors also report that empirical research has provided mixed results in the case of open market share repurchases. Here, the results indicate modest growth or a decline in operating income. In addition, the undervaluation motive is not sufficient to explain the rise in open market share repurchases. As Grullon and Ikenberry (2000) argue if undervaluation was the case then companies would signal this with fixed price share repurchases which cause an average 15% share price increase contrary to the 4% of open market share repurchases. Therefore, either companies who repurchase would be either slightly undervalued or there is a problem of market under reaction.

However, survey results are generally in support of the signaling hypothesis. Almost 90% of financial executives in European and US firms responded that the market price of their stock is important or very important on their decision to repurchase indicating a signaling motive (Bancel et al., 2005). Almost identical is the response in the survey of Brav et al. (2005) for US companies. Similarly Baker et al. (2003), claim that their results are mostly in favor of the undervaluation version of the signaling hypothesis. However, in the survey of Brav et al. (2005) US executives reject the notion that repurchases are utilized as a costly signal while they accept that they carry an informational content. Finally, surveys of UK executives by Dixon et al. (2008) and Dhanani and Roberts (2009) identify undervaluation signaling as a motive to repurchase though less important than the motive of returning excess cash flows to shareholders.

Finally, the existence of asymmetric information between insiders and investors is supported by the results of Brockman and Chung (2001). Their study showed that bid ask spreads widen and depths narrow during the actual repurchase period indicating that investors perceive the superiority of information that managers possess. In addition, by comparing the actual repurchase costs to a bootstrapping method - generated ''naïve'' accumulation plan, their study showed that the managers' strategy outperformed the uninformed one in every single year of their 1991-1999 period.

Summarizing, we can say that research supports the asymmetric information assumption of the signaling theory. In addition, as in the case with dividends we can assume that repurchases carry an informational content which the market perceives as positive; but this content seems not to be better

prospects as signaling theory states. In some cases, the positive market reaction could be attributed to the perception that the repurchase led to a decrease in agency costs.

2.5.2 Repurchases and the agency theory of free cash flows

Another theory that has been borrowed from the dividend literature to explain the increasing use of repurchases is the agency theory of Jensen and Meckling (1976). Managers often spend the resources under their control in non-shareholder wealth maximizing activities. Shareholders therefore incur monitoring and bonding costs in order to ensure that managerial actions maximize shareholder wealth. Therefore, repurchases as in the case of dividends can be used to distribute cash to the firm's shareholders and therefore reduce the amount of resources under managerial control. This decrease in resources will increase the probability that managers will have to resort to external financing and therefore be subject to strict capital market monitoring. As a result, managers will be forced to use the remaining resources in a more prudent way, which will be more aligned to the shareholders' interests; thus keeping their position and ensuring the availability of external financing. Agency costs are expected to be more severe in firms that generate significant free cash flows (Jensen, 1986).

If this theory holds, the market reaction to the decision to repurchase will be more positive for firms that have substantial free cash flows. A study by Wang et al. (2009) examines this hypothesis. Wang et al. (2009) observe that the market reaction is more favorable to actual repurchases decisions by firms with low Tobin's Q (an indicator of growth opportunities). This seems consistent with the agency-free cash flows theory since firms with low

growth/investment opportunities are more likely to have more excess cash. Hjelmstad et al. (2006) have tested the same hypothesis for a sample of UK firms. Using various proxies for growth the authors found a significant negative relationship between firm growth and the abnormal return on the repurchase announcement; a finding again consistent with the agency- free cash flows theory.

Managerial views indicate that the existence of excess cash flows is an important motive for firms to buy back shares. In the surveys of Bancel et al. (2005) and Brav et al. (2005), 60 - 65% of US and European firms' managers view the ''having extra cash/liquid assets relative to my desired shareholdings'' as an ''important or very important'' share repurchase motive. In addition, Dhanani and Roberts (2009) report that even though UK executives listed various reasons as repurchase motives the recurrent motivation was the opportunity to return excess cash flows to shareholders. Similarly, the statement ''to return excess cash to shareholders'' is ranked second in the responses of UK manager motives for share buybacks in the survey of Dixon et al. (2008). It seems that empirical research supports the validity of the agency theory and the theory of free cash flows. In addition, managerial views rank the existence of free cash flows as one of the most important motives to repurchase. In addition as Grullon and Michaely (2004) state, these theories are also able to explain part of the empirical fact of positive price reactions to actual repurchases and repurchase announcement.

2.5.3 Repurchases as dividend substitutes

The remarkable rise in the use of repurchases, especially in the US, that has been noted by many studies (e.g. Dittmar 2008; DeAngelo et al. 2008; Skinner 2008), has led researchers to hypothesize that repurchases are

starting to substitute dividends as a mean to return cash to the company's shareholders. Grullon and Michaely (2002a) report a series of findings regarding the US market that are supportive of the dividend substitution hypothesis. Their first indication is that even though figures show a decline in the dividend payout ratio of US firms the total payout ratio seems constant (after the 1980's). In addition, Grullon and Michaely (2002a) report that established corporations prefer to return cash to shareholders in the form of repurchases rather than with a dividend increase. Finally, the authors claim that the market shows signs that it perceives repurchases as dividend substitutes. The reason is that their test of market reaction of dividend cuts from firms that repurchase is not significantly different from zero.

Due to indications that in fact repurchases are substituting dividends, some researchers started to investigate the possible motives behind this phenomenon. Most of the literature has identified and focused its attention on two possible motives; tax related and employee and managerial compensation related motives.

As described in the clientele theory for dividends each group of investors in a firm is taxed differently on dividends and on capital gains. Considering that repurchases as capital gains carry less tax burden for individual investors, firms might prefer to distribute their earnings in the form of repurchases. However, this theory is in contrast with the existence of different investor groups in firms some of whom might prefer dividends. As Barclay et al. (2009) note, corporations prefer dividends to repurchases because in their case dividends are taxed less than capital gains. If, therefore, repurchases are tax motivated we would expect to see individual investors attracted to firms that repurchase and corporations to move towards dividend paying firms.

However, empirical findings and observations regarding the tax motive for repurchases are inconclusive. Grullon and Michaely (2002a) run a cross sectional regression to test the relationship between the cumulative abnormal return around the open market repurchase announcement day and ''the tax differential between the top marginal tax rate on ordinary income and the top marginal tax rate on capital gains''(p.21). The relationship is found to be positive and statistically significant. This might be an indication that the market values the expected tax benefits of dividend substitution. In contrast, a study on the Australian market where due to the imputation system the difference between dividends and capital gains is much smaller, Brown and Day (2007) find no signs of tax related dividend substitution. Their study reports that the repurchase yield is positively related to dividend increases. Finally, in the surveys of Bancel et al. (2005) and Brav et al. (2005) only a small percentage of financial executives from the US and Europe mentioned the tax benefits of repurchases as an important motive.

Another focus of the research surrounding repurchases has been the existence of employee and managerial options and EPS related managerial compensation. Kahle (2002) argues that the rise in repurchases can be attributed to the rise in the use of stock options as a form of employee and executive compensation. Under this consideration Kahle, supports that stock repurchases have two advantages. First, they provide the firm with stocks to fund its employee stock option plans. Second, repurchases do not affect managerial wealth because they do not reduce the value of managerial stock options (as dividends do). In her study of open market share repurchases, Kahle (2002) finds that the probability that a firm will repurchase is positively related to the amount of executive options and that the size of actual

repurchases is positively related to the total options exercisable but independent of the number of stock options held by managers. In addition, the author argues that this motive is perceived by the market, which has a less positive reaction to firms that repurchase stock and have a large number of non-managerial exercisable stock options. Another aspect of the relation between stock option compensation is given by Weisbenner (2000), who emphasizes the dilutive effect of stock options on EPS. Weisbenner (2000) argues that managers are trying to mitigate the EPS dilution effect with share repurchases for two reasons: The first is that EPS is used in equity valuations by investors and analysts. The second is that executive compensation is often EPS performance related. His study provides supportive evidence that the number of outstanding stock options and repurchases are positively related. Similar are the results of Fenn and Liang (1999), who find a positive relationship between managerial stock options and share repurchases. Finally, Young and Yang (2011) in their UK market based study focus on the relationship between repurchases and the existence of EPS performance related conditions in executive compensation contracts. Their study finds that firms which have EPS related conditions in the executive compensation contracts are more likely to use repurchases as a payout method.

In general the positive impact of repurchases on EPS (either through the mitigation of the dilution from exercised options or equity valuation or executive compensation) has been supported by executive responses in various surveys. For example in the Bancel and Mittoo (2005) survey 75% of US and 52% of European managers find rate the ''increasing EPS'' as an important or very important reason to repurchase. In the same survey the respective percentages for ''offsetting the dillutionary effects of stock option

plans'' (p38), are 67% and 29% respectively. Exactly the same high percentages are reported from US managers in the survey of Brav et al. (2003). Finally, Dhanani and Roberts (2009) report that increasing EPS is the second most frequently reported motive to repurchase stock as it has been identifies as a motive from 49% UK managers surveyed.

Quantitative and survey based research seem to agree that the existence of employee and managerial options and EPS related managerial compensation on payout policy do affect payout policy. Both research methods indicate that the existence of such conditions favor repurchases as a method of returning cash to shareholders, everything else held constant.

2.5.4 The Gearing motive

Since a repurchase of stock, especially if it is followed by a cancellation of shares, has a direct effect on the company's debt to equity ratio, many researchers theorized that repurchases might be used to move the company's capital structure towards a more preferred level. Managerial reviews give moderate support to the capital structure hypothesis in both the US and the UK. In the US only 10% of managers consider ''changing the capital structure of the firms'' as a highly important reason for repurchase, while 54% state that it does not have any effect on the decision to repurchase (Baker et al., 2003). In the UK, Dhanani and Roberts (2009) report that 36% of the repurchasing firms' sample agreed that ''increasing the firm's gearing'' is a repurchase motive. The exception is Dixon et al.'s (2008) survey of UK firms where the statement that firms utilize repurchases a method of increasing the firms' leverage is ranked as the most important by managers' responses. This extreme difference in ranking between the two UK surveys can be explained by the different period, which the survey was conducted. The survey of Dixon

et al. (2008) was conducted before the change in the UK regulatory framework that allowed the repurchase shares to be kept as treasury stock. Before the change repurchase share had to be cancelled. Therefore, as the authors indicate, it is not surprising that their study finds the most significant motive to be ''to achieve an optimal capital structure''.

Finally, Ditmmar (2000) uses a series of Tobit regressions to test hypotheses derived from all repurchase related theories. According to the results the author argues that the significance of each motive varies over time and that firms during certain periods use repurchases to change their capital structure.

From the above research findings it seems that sometimes firms do consider repurchases as a mean alter their capital structure. However, the frequency of this motive might be conditional upon other factors (e.g. the existence of a legal framework as the UK where repurchased stock had to be cancelled).

2.5.5 Summary and Discussion

This sub-chapter has presented the most significant theories and empirical research regarding payout policy. The focus was on dividends and share repurchases, as these two methods have been the predominant forms of payout in the last two decades. The emerging share repurchase literature has borrowed many of its theories from dividends. As a result, the theoretical framework that was used to investigate these two forms of payouts came from the three theories: signaling theory, agency theory and tax based theory. In the case of share repurchases two additional theories have been developed which attribute the increasing use of this method to certain motives such as: altering the company's capital structure and influencing EPS (either to mitigate the dilution effect of employee stock options or increase EPS when executive compensation is EPS related).

It appears that each theory independently cannot fully explain payout policy decision-making. However, quantitative studies and managerial views identify most of the payout policy determinants derived from these theories as valid. However, the relative importance of each factor is not clear and requires further research. Furthermore, as Weigand and Baker (2009) highlight, studies so far have not been able to explain clearly how firms choose between dividends and share repurchases. This research aims to contribute to our understanding of this issue. By investigating, the interaction of share repurchases with other financial decisions we expect to provide a greater understanding of how firms choose between dividends and share repurchases as a payout method.

As in the case with capital structure, the lack of clear results may be attributed to the fact that dividend and share repurchases have been investigated in isolation from other financial decisions. It may be the case that payout policy investigations will produce clearer results when analyzed jointly with other key financial policies such as capital structure. A joint evaluation of payout policy and capital structure can be justified within both an Agency theory as well as a Pecking Order framework. As we shall see in the next part of this section, a number of studies have addressed this issue and investigated capital structure and dividends jointly using simultaneous equations while providing encouraging results. This area of research may be worthwhile of further investigation, in terms of possible modifications, which might enhance the system of equations. For example, a significant observation is that these studies do not recognize share repurchases as a significant component of the system even though the use of share repurchases would suggest otherwise.

2.6 Interaction and simultaneous determination of Payout and Capital Structure Policy

A point that has been largely ignored by the Corporate Finance literature is the possible interdependence between corporate financial policies. Such interdependence can be justified both by rational and by existing theories. For example, according to McCabe (1979) firm behaviour can be described as the process of obtaining limited funds and allocating them to dividends and investment. From this viewpoint capital structure, payout and investment policy are interdependent. The author therefore argues that the appropriate method to investigate corporate financial decision-making is by using simultaneous equation systems. However, the majority of research so far has investigated each financial decision in isolation while the percentage of studies using a system of simultaneous equations seems surprisingly small.

In addition to the rationale of McCabe (1979), existing theories also provide links between distinct financial policies (Faulkender et al. 2006; Aggarwan and Kyaw 2010). A first example is the Pecking Order theory of Myers (1984). This theory links capital structure and dividend policy as it hypothesizes that firms adjust their dividend payments while taking into consideration retained earnings and investment opportunities. Another, example is agency theory. As explained previously, Easterbrook (1984) suggests an agency cost explanation of dividends that associates dividend policy with capital structure. According to the author, firms pay out dividends and consequently issue equity[14]. Therefore, in the context of agency theory, payout policy is linked to capital structure decisions. Only comparatively a few papers (McCabe. 1979; Jensen et al., 1992; Noronha et al., 1996; Crutchley et al., 1999; Faulkender et al.,

[14] Issuing equity will reduce agency costs in two ways: it will reduce monitoring costs since the firm's management will be under the strict monitoring of the market. In addition, it will force firm's management to be more efficient with the now reduced resourcess under its control.

2006; Ding and Murinde, 2010; Aggarwan and Kyaw, 2010) draw on these considerations to investigate jointly, capital structure and dividend policy. Studies which examine the possibility that capital structure and dividend policy are simultaneously determined are even rarer (e.g. Ding and Murinde, 2010; Faulkender et al., 2006; Noronha et al., 1996), though their findings generally support this contention.

However, none of these studies includes share repurchases in their modeling. While historically dividends represent the most common and widely used method of payout, as discussed earlier, more recently the importance of share repurchases for corporate payout policies has noticeably increased, both in the USA and in the UK. This suggests that research into the relationship between dividend payouts and share repurchases and capital structure decisions is a timely endeavor.

However, since research findings regarding share repurchases indicate a significant component of payout policy it seems appropriate to include a related endogenous variable into this investigation.

McCabe's (1979) study is one of the earliest attempts to investigate jointly, distinct corporate policies in a sample of US firms. He utilized a three simultaneous equation model with new debt, investment and dividend as endogenous variables. The results indicate interdependence between these 3 policies. Investment has a statistically significant negative effect on dividends and dividends a statistically significant negative effect on investment. This supports the author's theory that investment and dividends are a competing use of funds. In addition, investment and dividends have a positive effect on new debt for most of the years of the sample as well as for the pooled sample. New debt also seems to have a statistically significant positive effect on

dividends and investment for most of the years of the sample. McCabe (1979) interprets his findings as strong evidence of interdependence between capital structure, dividend policy and investments. He also argues that taking under consideration his findings, future attention should focus on results derived from simultaneous equation techniques. However, McCabe's (1979) study does not include an ownership control variable, which according to research that is more recent affects a firm's financial policies. Research that is more recent indicates that ownership seems to play an important role in determining corporate behaviour. In particular, most of the limited number of studies that use simultaneous equations include an ownership variable in their modeling.

This short-coming is remedied by research by Jensen et al. (1992) and Crutchley et al. (1999), who investigate corporate decision-making in an agency cost and asymmetric information framework. The authors include ownership concentration as an endogenous variable in their system of equations, in line with theoretical considerations that ownership structures can affect agency costs. Jensen et al. (1992) find that insider ownership concentration has a statistically significant negative impact on dividends and debt but dividend and debt policies do not determine insider ownership. Crutchley et al. (1999) expand the system of Jensen et al. (1992) and add institutional ownership as an exogenous variable. Their system therefore comprises of four equations with debt, dividends, insider ownership and institutional ownership as endogenous variables. The authors argue that this modification enhances the system. Their findings indicate that debt, dividends, insider ownership and institutional ownership are interdependent and simultaneously determined. In addition, Crutchley et al.'s (1999) findings change different results between 1987 and 1993. More specifically institutional

ownership is positively related to debt as well as to dividends for the 1987 period. However, this relationship turns negative for the 1993 period. The authors argue that their system captured the anecdotal fact that institutional investors are more actively monitoring firms' related decisions. Therefore institutional ownership has become a substitute for internal monitoring mechanisms like dividends and debt.

While the studies of Noronha et al. (1996) and Ding and Murinde (2010) follow a similar theoretical reasoning, their analytical approach differs. Their models only acknowledge two endogenous variables, dividends and debt, while ownership variables (insider holdings and number of shareholders) are treated as exogenous variables. In addition, Noronha et al. (1996) separate their sample according to the existence of non-dividend means for mitigating agency costs[15] and growth[16]. The authors hypothesize that simultaneity between dividends and debt is not expected for the sub group of firms with high growth and/or non-dividend mechanisms to reduce agency costs. The findings of Noronha et al. (1996) confirm the authors' hypothesis. Strong simultaneity and interaction between capital structure and dividend policy were found for the subgroup of firms, which are being characterized by both low presence of non-dividend means of reducing agency problems and low growth.

Ding and Murinde (2010) apply the agency framework and simultaneous equation system of Noronha et al. (1996) to a sample of UK firms (date line1986-1988, 1997-2003). Their research also finds supportive evidence that capital structure and dividend policy are simultaneously determined in UK

[15] Such alternative mechanisms to mitigate agency costs are the presence of a large (shareholding in excess of 5%) outside blockholders who serve as an external monitors, the possibility/likelihood of takeovers and the use of performance related managerial pay aimed at aligning managers' interests top those of shareholders.
[16] High growth is expected to induce capital market monitoring.

firms. However both studies do not include a share repurchase variable, despite the fact that in the period under review in Ding and Murinde's (2010) research, share repurchases were soaring in the UK.

Finally, a recent study by Aggarwal and Kyaw (2010) finds a positive simultaneous interaction between capital structure and dividends in a sample of multinational firms. However, their research also ignores share repurchases. In general research findings from studies that utilize simultaneous equations systems indicate the capital structure and dividends are simultaneously determined. However, the direction of these relationships is not clear. Furthermore, these studies do not account for share repurchases as an important component of payout policy. The modification of such systems in order to include a share repurchases endogenous variable is worthwhile as it might provide more insight into corporate financial decision-making. Furthermore, it will likely improve the system of equations as it will reduce omitted variable bias and provide more clear indications as far the direction between the interdependent relationships of financial policies is concerned.

2.7 Summary

The rise of share repurchases as a popular payout method has raised concerns about their impact on key financial decisions such as investment, dividends and capital structure (FINNOV, 2012; Foroohar 2013). So far there has been research into the relationship e.g. between share repurchases and dividend pay-outs (see Jagannathan et al. 2000; Grullon and Michaely 2002) indicating dividend substitution however results are not conclusive. Furthermore, it appears that there has been no research, which investigates the possible interaction between share repurchases and other key financial decisions such as investment and leverage. In addition, the aforementioned decisions have

been mostly investigated in isolation from one another and thus are likely to suffer from misspecification, endogeneity and spurious correlation concerns leading to wrong causality inferences (Jensen et al. 1992; Faulkender et al. 2006; Aggarwan and Kyaw 2010).

In order to address these methodological concerns this study, considering the period before and after the credit crunch, employs a simultaneous equation framework to investigate the interdependence in financial decision-making suggested by extant theories. By investigating jointly share repurchases, dividends, investment and capital structure endogeneity and misspecification concerns are accounted for. Furthermore, the findings provide empirical support to concerns regarding the impact of share repurchases on key financial decisions. Thus, they are expected to be of importance to regulators and investors alike. Furthermore, the sample country choice (US, UK) and the time frame of this study (the pre and post crisis period) provide the opportunity for more insight on how different macroeconomic conditions and national differences can impact on capital structure, dividend, share repurchase and investment decisions and more specifically on the integration of share repurchases into firm financial decision-making.

3. Are share repurchases an integral part of US financial decision-making?

3.1 Introduction

As identified in the previous chapter, the frequency and magnitude of share repurchases as a form of payout has raised economists' concerns regarding their effect on key financial decisions such as investment and capital structure (FINNOV, 2012; Foroohar 2013). However, there has been no research, which investigates the interactions between share repurchases, capital structure and investment even though extant theories and empirical research suggest such interactions. There has been research into the relationship e.g. between share repurchases and dividend pay-outs (see Jagannathan et al. 2000; Grullon and Michaely 2002) indicating dividend substitution, however results are not conclusive. Moreover, the aforementioned decisions have been mostly investigated in isolation from one another and it is therefore highly probable that previous models used to investigate these financial decisions are misspecified and suffer from endogeneity problems (Aggarwan and Kyaw, 2010).

In order to address both the lack of research into the relationship between share repurchases, dividends as well as investment and leverage and concerns about misspecification in previous research into financial decision-making, we investigate jointly capital structure, payout and investment policies within a system of equations using sample of large US companies. The majority of publicly listed US firms distribute funds both through dividends and share repurchases (Floyd et al. 2013), and in 1999, 2000, 2004, 2005 and 2006 the annual level of share repurchases actually surpassed that of cash dividends (Dittmar 2008). As share repurchases are especially prevalent in the USA, in

terms of both magnitude and frequency we expect that US firms are particularly likely to integrate share repurchase programs systematically into their financial decision-making.

In order to address these methodological concerns this study, considering the period before and after the credit crunch, employs a simultaneous equation framework to investigate the interdependence in financial decision-making suggested by extant theories. By investigating jointly share repurchases, dividends, investment and capital structure endogeneity and misspecification concerns are accounted for.

In order to estimate the system of equations we utilize ordinary least squares (OLS) regressions as well as two simultaneous estimation techniques, two-stage least squares (2SLS) and three stage least squares (3SLS) regressions. This allows for a more appropriate testing of existing dividend and capital structure theories and determinants, as endogeneity and spurious correlation issues expected to be present in previous research are accounted for. In this context, we are able to draw on the rich US-based theoretical and empirical literature regarding capital structure, payout and investment policies to identify suitable control variables to design an appropriate system of equations.

The rest of this chapter is structured as follows. Section 2 provides a review of relevant payout and capital structure theories and identifies possible relations regarding capital structure, dividend payout, share repurchases and investment. Section 3 provides a description of the data and an explanation of the chosen research methodology. Section 4 describes and interprets the empirical results. Section 5 presents the conclusion.

3.2 Literature review

Research into determinants of firms' capital structures and payout policies has been heavily influenced by Modigliani and Miller's "Capital Structure Irrelevance" (1958) and "Dividend Irrelevance" theorems (1961). Under a set of restrictive assumptions, such as no taxation, no asymmetric information and no transaction, agency or bankruptcy costs, Modigliani and Miller show that real value cannot be created just by financing or payout decisions but only through a firm's operations and choice of investment projects. However, once these assumptions are relaxed, theories such as Pecking Order Theory, Free Cash Flow and Agency Theory, Signaling Theory, Trade-Off Theory and Tax Clientele Theory can be used to explain why capital structure and dividend policies are indeed value relevant. Many of the theories developed to explain specifically the rationale for and implications of dividend policies have subsequently been adapted to explain the phenomenon of share repurchases (see Grullon and Ikenberry 2000; Oswald and Young 2008).

However, the different theories often lead to different predictions about the drivers of and relationships between capital structure, investment and payout policies. Moreover, empirical research fails to provide clear evidence to support one theory over another. For example, research by De Angelo and De Angelo (2007) suggests that, contrary to Pecking Order Theory, some firms issue equity in situations when debt financing is available and that, contrary to Trade-Off Theory, very profitable firms often maintain low debt levels and thus do not exploit tax shields.

In addition, empirical studies often produce inconsistent results (Faulkender et al. 2006; Frank and Goyal 2009). Faulkender et al. (2006, p.1) suggest that these inconsistencies could be due to the fact that so far the empirical

literature has largely "treated dividend policy and capital structure as two distinct choices, even though there is reason to believe that there are common factors affecting both". Similarly, Aggarwal and Kyaw (2010, pp.142) argue that due to "the interdependence between dividend policy and capital structure, empirical studies of capital structure … are most likely mis-specified unless they include an assessment of dividend policy".

One of the most prominent theories to suggest that decisions about firms' capital structure, payout and investment policies are related is Pecking Order Theory (Myers 1984; Myers and Malijuf 1984). Pecking Order Theory is based on the premise that investors' are aware that managers might engage in opportunistic behaviour and obscure or distort information about the company's risk, value and investment opportunities. This is expected to make investors suspicious about the firms' financing decisions and lead to the mispricing of firms' securities, high costs of external, in particular equity, capital and might limit firms' ability to fund profitable investment projects. It is therefore assumed that, to protect their own interests and the interests of existing shareholders, managers prefer internal over external financing. With regard to mobilizing internal finance, firms are expected to utilize their free cash flow, draw down their cash balances or even adjust their payout policies to fund investment opportunities. However, given cash flow limitations, fluctuations, and the 'stickiness' of dividends, many firms 'internal financing abilities are curtailed and managers might have to resort to external financing. In this case, managers are expected to favor issuing less risky securities where asymmetric information costs are more limited, so that debt is preferred over hybrid securities, the last resort being equity finance.

Consequently, Pecking Order Theory implies a negative relationship between firms' investment opportunities and their dividend payout ratios or share repurchases. Moreover, Pecking Order Theory suggests that, ceteris paribus, firms with higher dividend payout ratios will have lower retained earnings and thus need to rely more on debt to fund investment opportunities. Based on this logic firms that engage in share repurchases either need to reduce dividends or they need to raise outside capital, preferably debt, to fund investment opportunities. Pecking Order Theory therefore predicts that in the long run the use of share repurchases leads to a decrease in the dividend payout ratio and/or an increase in the firm's leverage.

Another prominent theory, which suggests that decisions about firms' capital structure, payout and investment policies are related, is Free Cash Flow Theory (Jensen 1986). Free Cash Flow Theory suggests that debt, dividends and share repurchases can be utilized to reduce the agency costs of free cash flow. This is based on the assumption that, due to the separation of ownership from control, managers of firms, which generate high levels of free cash flow, might engage in opportunistic behaviour and waste funds on inefficient investments or managerial perquisites. In competitive markets, investors' awareness of the risk of managerial exploitation of free cash flows can lead to pressure to reduce free cash flows by returning funds to shareholders. In this context, Jensen (1986) argues that debt can be seen as an alternative, more binding mechanism, to reduce free cash flows than dividend payments. Jensen reasons that in markets with limited control via competitive markets, managers are likely to prefer reducing free cash flow via share repurchases, over dividends and over leverage. This implies a negative relationship between these three variables.

However, if firms are operating in competitive markets, Jensen (1986) suggests that the increase of leverage ratios to reduce agency costs is likely to be correlated with share repurchases, which not only aids the reduction of free cash flow and but also ensures that the increase in debt does not lead to an increase in the firms' total capital. Thus, for firms, which generate a large amount of free cash flow and operate in competitive markets, Jensen's arguments point towards a positive relationship between leverage and share repurchases.

Moreover, given Jensen's (1986, p. 323) premise that "free cash flow is cash flow in excess of that required to fund all projects that have positive net present values when discounted at the relevant cost of capital", Free Cash Flow Theory suggests ceteris paribus a negative relationship between firms' profitable investment opportunities and dividends and/or share repurchases. With regard to the relationship between firms' profitable investment opportunities and leverage, Jensen's (1986) reasoning suggests a positive relationship for resources constrained firms and a negative relationship for firms with high amounts of free cash flows.

Prior research into the joint determination of capital structure, dividend and investment policy generally supports the contention that these three issues are interrelated (see McCabe 1979; Jensen et al. 1992; Barclay et al. 1995; Noronha et al. 1996; Crutchley et al. 1999; Faulkender et al. 2006; Ding and Murinde 2010; Aggarwan and Kyaw 2010). However, as none of these studies includes share repurchases in their considerations, those that consider more recent samples in which share repurchases were prevalent are likely to be misspecified.

McCabe's (1979) study is one of the earliest attempts to investigate jointly distinct corporate policies in a sample of US firms. He utilized a three simultaneous equation model with new debt, investment and dividends as endogenous variables. The results indicate interdependence between these three policies. Investment was found to have a statistically significant negative effect on dividends and dividends a statistically significant negative effect on investment, supporting the author's contention that investment and dividends are competing uses of funds. In addition, investment and dividends had a positive effect on new debt and vice versa for most of the years of the sample. McCabe (1979) interprets his findings as strong evidence of interdependence between capital structure, dividend policy and investments. He also argues that taking under consideration his findings, future attention should focus on results derived from simultaneous equation techniques. However, McCabe's (1979) model fails to control for important variables, such as growth opportunities and firm size, making it prone to misspecification problems. Adedeji (1998) who tests the Pecking Order Theory in the UK, using a similar three-equation system with a wider set of control variables, remedies this. Adedeji's (1998) findings are similar to McCabe's (1979) with regard to finding a negative relationship between investment and dividends. However, contrary to McCabe's study, Adedeji (1998) fails to identify a significant impact of debt on investment. However, this deviation might relate to the fact that Adedeji (1998) uses capital structure levels instead of new debt as his endogenous variable.

Several studies investigate corporate decision-making in an agency cost and asymmetric information framework (see Ding and Murinde 2010 for the UK market and Jensen et al. 1992, Noronha et al. 1996, and Crutchley et al. 1999

for the US market). These studies report strong simultaneity and a negative interaction between capital structure and dividend policy. Noronha et al. (1996) and Ding and Murinde (2010) apply the same theoretical reasoning and modeling to samples of US and UK firms respectively. Their models only acknowledge two endogenous variables, dividends and leverage, and ignore both share repurchases and investment.

While Jensen et al. (1992) and Crutchley et al. (1999) include investment in their modeling; they only integrate it as an exogenous variable. These studies also confirm the negative simultaneous relationship between capital structure and dividend policy reported by Noronha et al. (1996) and Ding and Murinde (2010).

Finally, a recent study by Aggarwal and Kyaw (2010) finds a positive simultaneous interaction between capital structure and dividends in a sample of multinational firms. However, their modeling also ignores investment and share repurchases.

In summary, research findings from studies that utilize simultaneous equations systems indicate the capital structure, dividends and investment are likely to be simultaneously determined in US firms. However, findings regarding the direction of these relationships are inconclusive. Moreover, prior studies fail to account for share repurchases as an important component of payout policy.

The extension of simultaneous equations systems in order to include share repurchases as an endogenous variable is worthwhile as it might provide more insight into corporate financial decision-making. Furthermore, it is likely improve the system of equations as it will reduce omitted variable bias and

provide clearer indications regarding the directions of the interdependent relationships of financial policies.

3.3 Data and methodology

3.3.1 Sample

As we want to explore whether share repurchases are an integral part of large US firms' financial decision-making the initial sample comprises of firms listed in the S&P 500 index. The sample period is 2005-2011. Corporate financial data for this study is collected from the Thomson Reuters Datastream database.

As decisions about investments, capital structure and pay-out policies are deemed long-term decisions (Adedeji 1998; McCabe 1979) we follow previous literature (Adedeji, 1998) and use 4 year-averages for our variables. The sample period therefore allows us to consider whether the relationship between key financial decisions changed due to the 2008/09 credit crunch. Given earlier suggestions that share repurchases provide more flexibility to managers and might therefore be taken subsequent to, rather than simultaneously with, dividend and investment decisions (Brav et al. 2005), we are particularly interested whether the interaction between share repurchases on other financial decisions recedes after the credit crunch.

We therefore split the period under observation into two subsamples 2005-2008 and 2008-2011. We observe that between 2005 and 2007 share repurchases experienced a consistent growth with a small decrease in 2008 before a much more noticeable contraction in 2009 (see table 4). Considering this contraction and keeping in mind the long-term nature of financial decisions, we expect that during 2008 many firms readjusted their financial

policies in light of the liquidity crisis, triggered by the collapse of Lehman Brothers in September 2008 and the 2008-2009 recession. We therefore included 2008 in both periods.

Table 4 Share Repurchases to Net Income (annually 2005-2011)

Year	Mean	Std. Dev.	Min	Max	Obs.
2005	0.49	0.50	0	1.45	272
2006	0.67	0.58	0	1.75	272
2007	0.88	0.77	0	2.35	272
2008	0.67	0.57	0	1.74	272
2009	0.27	0.32	0	0.89	272
2010	0.42	0.41	0	1.18	272
2011	0.62	0.50	0	1.49	272

Financial and utilities firms as well as firms with missing observations are excluded. The final sample consists of 272 firms.

3.3.2 The empirical model

With regard to this study's objectives, we formulate the following system of equations, consisting of one equation for each financial decision under investigation. For every company i, each financial decision is a function of the remaining ones, plus a vector of exogenous control variables related to the specific financial decision. Thus, we arrive at the following system of equations,

$$LEV_i = f_1(DIV_i, REP_i, INV_i, Controls_{1i}) + \varepsilon_{1i} \quad (1)$$

$$DIV_i = f_2(LEV_i, REP_i, INV_i, Controls_{2i}) + \varepsilon_{2i} \quad (2)$$

$$REP_i = f_3(LEV_i, DIV_i, INV_i, Controls_{3i}) + \varepsilon_{3i} \quad (3)$$

$$INV_i = f_4(LEV_i, DIV_i, REP_i, Controls_{4i}) + \varepsilon_{4i} \quad (4)$$

where $\varepsilon_{1i,}$ ε_{2i}, ε_{3i}, ε_{4i} are stochastic zero mean error terms.

The dependent variables LEV, DIV, REP and INV represent Leverage, Dividends, Share Repurchases and Investment respectively. $Controls_{i1}$, $Controls_{2i}$, $Controls_{3i}$ and $Controls_{i4}$ are the respective vectors of exogenous control variables for each dependent variable. The control variables included in each vector have been identified based on relevant theories and prior empirical research.

We hypothesize that firms make long-run decisions regarding their capital structure, payout and investment policies, which are consistent with each other. The theoretical considerations about the interdependence between the above-mentioned financial decisions imply that the corresponding variables (LEV, DIV, REP, INV) are endogenous. As a result, these endogenous variables will correlate with the error term in each equation, thus violating the relevant Ordinary Least Squares (OLS) assumption. Consequently, the estimation of

each equation in the system using (OLS) will produce biased and inconsistent coefficients.

Estimation methods that are appropriate in the presence of endogeneity issues are two-stage Least Squares (2SLS) and three-stage Least Squares (3SLS) (Gujarati, 2004).

The first stage of the 2SLS procedure regresses each endogenous variable (LEV_i, DIV_i, REP_i, INV_i) on every exogenous variable in the system (i.e. the control variables included in $Controls_{1i}$, $Controls_{2i}$, $Controls_{3i}$ and $Controls_{4i}$) to obtain the fitted values. The obtained fitted values are "purged" of the influence of the respective disturbance terms. For the second stage of the 2SLS process, the obtained fitted values are used as instruments, replacing the right hand side endogenous variables in equations (1)-(4). The 2SLS process produces consistent estimates. However, 2SLS is a limited information method as it estimates each equation in the system individually without worrying about the restrictions on the other equations in the system and hence may be inefficient.

By contrast, the 3SLS process is a full information method, which estimates all the equations in the model simultaneously, thus taking into account any restrictions resulting from the omission or inclusion of a variable in each equation. However, as Gujarati (2004) notes, 3SLS is sensitive to specification errors. Since 3SLS is a full information method, if one equation is misspecified, the error is transferred to the rest of the system's equations.

Instruments are chosen in accordance to previous literature. We follow McCabe (1979) and Aggarwal and Kyaw (2010) and choose firm systematic risk (BETA) as an instrumental variable for dividends (DIV). We choose bankruptcy risk (ZSCORE) and collateral (COLTRL) as instruments for leverage

(LEV) (see Noronha et al 1996; Aivazian et al 2005; Aggarwal and Kyaw 2010). As share repurchases have not been used as an endogenous variable in research so far we base the choice for the relevant instrumental variables on two conditions. First, according to theoretical and empirical research these variables are correlated to share repurchases. Secondly, these variables have not been identified by earlier research as significant determinants of dividends, investment and leverage. Therefore, as instruments for share repurchases (REP) we use stock options (OPTIONS), share price returns (RETURN), stock liquidity (SLIQ) and cash holdings (CASH). Following a similar rationale, depreciation (DEPRC) is the instrumental variable for investment (INV).

In order to produce results comparable to previous studies; and to consider the impact of the different strengths and weaknesses of the different estimation techniques, this study employs OLS, 2SLS as well as 3SLS techniques for the estimation of the system of equations. As it will be shown later, the results produced by 2SLS and 3SLS are largely consistent with each other.

3.3.3 Vectors of control variables

The vectors of control variables are identified based on relevant theories and prior empirical research.

(1) Leverage – $Controls_{1i}$

According to Trade Off Theory (Myers 1984), profitability (ROA) is expected to be positively related to leverage. Profitable firms are expected to use more debt financing in order to exploit tax shields. The opposite is predicted by Pecking Order Theory, which suggests that firms that are more profitable prefer internal financing to reduce costs associated with information

asymmetry. Prior empirical results using these variables are inconclusive (Rajan and Zingales 1995; Wald 1999; Booth et al. 2001; Huang et Song 2006; Frank and Goyal 2009).

Jensen's (1986) Free Cash Flows Theory predicts that firms, which generate high free cash flows, use debt as a mechanism to mitigate agency costs. Thus, we expect a positive relationship between Leverage and the Free Cash Flow (FCF).

The predicted impact of firm size (SIZE) on leverage varies according to the theory employed. Trade-Off theory predicts a positive correlation between leverage and size as larger firms are expected to have a lower default probability. Free Cash Flow Theory predicts the same based on the assumption that larger firms generate more free cash flows. By contrast, Pecking Order Theory predicts a negative relationship between size and leverage, due to the assumption that asymmetric information decreases as size increases and large firms therefore face less costs of raising equity finance. Studies by Rajan and Zingales (1995), Booth et al. (2001), Frank and Goyal (2009), which utilize OLS estimation techniques find that leverage increases with firm size. However, using 2SLS and 3SLS estimation methods, Aggarwal and Kyaw (2010) report a negative relationship between leverage and firm size.

Firms with tangible assets can use them as collateral when a firm is taking on debt, thus reducing debt's agency costs (Jensen, 1976). We therefore control for collateral (COLTRL). Empirical research generally supports the contention that leverage is positively related with collateral (see Rajan and Zingales 1995, Chen 2004, Huang and Song 2006, and Frank and Goyal 2009).

Trade-Off Theory implies that firms determine their debt levels by balancing the benefits of debt (tax shields) against the costs of bankruptcy. We therefore

control for firms' bankruptcy risk (ZSCORE). Empirical research by Booth et al. (2001), and Frank and Goyal (2009) support this assertion.

Finally, in line with Wald (1999), Chen (2004) and Delcoure (2007) we control for firms' growth opportunities (GROWTH). Agency Theory suggests that firms with good growth opportunities tend to rely more on equity financing due to the potential agency costs of debt. The value of shareholders' equity can be viewed as a call option with a strike price equal to the value of debt. Since the value of this option increases with the variance of the firm's future cash flows, managers might be tempted to invest in risky projects to increase shareholders' wealth. This will have a negative impact on debtholders, since it increases their risk and therefore decreases the value of debt as the same fixed cash flow return from their bonds becomes more risky. In order to avoid such behaviour creditors often impose restrictive covenants to ensure that firms will not substitute existing assets with riskier ones or increase their leverage above certain thresholds. This indicates a negative relationship between debt and growth opportunities. However, Pecking Order Theory suggests the opposite because firms with growth opportunities have greater financing needs and therefore higher leverage as managers are reluctant to issue stock. Research by Wald (1999) and Chen (2004) on samples of US firms support Pecking Order Theory's contentions that growth opportunities are positively related to leverage.

(2) Dividends - $Controls_{2i}$

Free Cash Flow Theory suggests that dividends can be used as a mechanism to reduce free cash flow (FCF) under managerial control and thereby agency costs. Therefore, we expect a positive effect of the FCF on dividends in line with previous research by Aggarwal and Kyaw (2011).

Pecking Order Theory suggests that more profitable firms will have the ability to maintain a higher level of dividend payout without the risk of resorting to external financing, as they generate more internal funds. Studies by Jensen (1992), and Aggarwal and Kyaw (2010) indeed report a positive relationship between dividends and profitability. We therefore control for profitability (ROA).

Free Cash Flow Theory predicts a positive relationship between dividends and firm size, based on the assumption that larger firms generate more free cash flows. This suggests that larger firms (SIZE) have higher payout ratios to reduce free cash flows and the corresponding agency costs. Empirical research by Aggarwal and Kyaw (2010) and Adedeji (1998) indeed find positive relationships between firm size and dividend payout.

As more risky firms are expected to pay lower dividends in order to reduce the probability of requiring costly external finance (Rozeff 1982), we follow Rozeff (1982) and Aggarwal and Kyaw (2010) and include a firm risk (BETA) as a determinant of dividend payout.

Finally, we control for firms' growth opportunities (GROWTH). We expect that, in order to avoid the costs of external finance, firms with higher growth opportunities will retain earnings instead of distributing them either in form of share repurchases or dividends (Rozeff 1982; Crutchley et al. 1999). Rozeff (1982) and Crutchley et al. (1999) confirm the expected negative relationship between growth opportunities and dividends.

(3) Share Repurchases - $Controls_{3i}$

Free Cash Flow Theory suggests that share repurchases are one mechanism for distributing excess cash flows to shareholders. This suggests a positive relationship between free cash flows and share repurchases. Empirical

research consistently supports free cash flows as one of the most important determinants for share repurchases (see Dittmar 2000; Oswald and Young 2008). Indeed, managers tend to rank the existence of free cash flows as one of the most important motives for share repurchases (see Brav et al. 2005; Dixon et al. 2008; Dhanani and Roberts 2009). We therefore we control for firms' cash flow (FCF).

As Lee and Suh (2011) present international evidence that share repurchases are associated with large cash holdings, we also control for Cash Holdings (CASH).

Signaling Theory suggests that managers might use share repurchases to signal positive information to the market. Vermaelen (1981) argues that smaller firms are more prone to suffer from information asymmetries as they receive less attention by the financial press and analysts. Hence, they are most likely to be undervalued. Therefore, share repurchases might be used to signal positive information to the market. This suggests a negative relationship between firm size and share repurchases. We therefore control for firm size (SIZE). However, while Dittmar's (2000) findings support this expectation, Oswald and Young (2008) report a positive relationship. One explanation for these inconsistencies might be that both studies use different size proxies, specifically total assets and market capitalization respectively.

If a company is undervalued, it will most likely exhibit a history of low returns (Dittmar 2000). We therefore also control for stock return (RETURN). While the relevant variable in the share repurchase regression of Dittmar (2000) is seldom negative and statistical significant, findings by Stephens and Weisbach (1998) and De Cesari et al. (2012) suggest that share repurchases are negatively related to stock price returns.

Kahle (2002) argues that the rise in repurchases can be attributed to the rise in the use of stock options as a form of employee and executive compensation. In this context share repurchases provide the firm with shares to fund employee stock option plans and help managers offset potential earnings per share dilution attributable to employee stock option plans (Bens, Nagar, Skinner and Wong 2003). We therefore use stock options expenses (OPTIONS) as an additional control variable. Research by Fenn and Liang (1999), Kahle (2000) and Bens et al. (2003) confirm the expected positive relationship between employee stock options and share repurchases.

In addition, we control for stock liquidity (SLIQ). Brockman et al. (2008) argue that, when market liquidity is low, managers might be reluctant to repurchase shares as this might increase transaction costs by widening the bid-ask-spread and by increasing the price impact of subsequent trades due to the reduced float. In contrast, De Cesari et al. (2011) suggest that firms might be able to use share repurchases to enhance their shares' liquidity. Both Brockman et al. (2008) and De Cesari (2011) find evidence for a positive relationship between share repurchases and stock liquidity.

Finally, we control for firm growth (GROWTH). Following the reasoning by Rozeff (1982) and Crutchley et al. (1999) regarding dividends, we expect growing firms to retain earnings instead of distributing them either in the form of share repurchases or dividends, in order to avoid the costs of external financing.

(4) Investment - $Controls_{4i}$

In line with prior literature, we expect that firms' financial constraints adversely affect their ability to fund investment. Since profitable firms are expected to be less financially constrained as they generate more funds to

finance investment opportunities internally (McCabe 1979; Demarzo, Fishman, He and Wang 2012), we expect profitability (ROA) to be positively related to investment.

The previous literature advances two main reasons why depreciation (DEPRC) is expected to be positively related to investment. While McCabe (1979) suggests that depreciation identifies cash flows, which can be used to fund investment, Abel and Eberly (2012) argue that, as the depreciation rate reflects the users' cost of capital, investment is a linear function of the depreciation rate.

While Gibrat's law suggests that firm size, (SIZE) should not be related to investment, prior empirical research into the relationship is inconclusive (Prombut et al. 2012). While research which focuses exclusively on very large firms tends not to find a statistically significant relationship, research which covers smaller firms or the whole range of size classes tends to find evidence that firm size is relevant to investment (Baskin 1989; Rahaman 2011; Prombutr et al. 2012).

Finally, firms with more growth opportunities (GROWTH) are expected to invest more. Therefore we also control for firms' growth (Rahaman 2011; Prombutr et al. 2012).

Substituting each of the vectors ($Controls_1$, $Controls_2$, $Controls_3$ and $Controls_4$), with the abovementioned variables, we arrive at the following system of equations[17]:

[17]As part of sensitivity testing we controlled for industry effects by re-estimating my system of equations including industry dummies in every equation. We did not observe any change in the direction of the relationships under investigation, however there were changes in statistical significance. Since in many cases the industry dummies were insignificant their inclusion most probably increased the coefficients' variance and thus affected their statistical significance.

(1) $LEV_i = \alpha 0 + \alpha 1 DIV_i + \alpha 2 REP_i + \alpha 3 INV_i + \alpha 4 ROA_i + \alpha 5 SIZE_i + \alpha 6 GROWTH_i + \alpha 7 FCF_i + \alpha 8 COLTRL_i + \alpha 9 ZSCORE_i + \varepsilon_1$

(2) $DIV_i = \beta 0 + \beta 1 LEV_i + \beta 2 REP_i + \beta 3 INV_i + \beta 4 ROA_i + \beta 5 SIZE_i + \beta 6 GROWTH_i + \beta 7 FCF_i + \beta 8 BETA_i + \varepsilon_2$

(3) $REP_i = \gamma 0 + \gamma 1 LEV + \gamma 2 DIV_i + \gamma 3 INV_i + \gamma 4 SIZE_i + \gamma 5 GROWTH_i + \gamma 6 FCF_i + \gamma 7 OPTIONS_i + \gamma 8 RETURN_i + \gamma 9 SLIQ_i + \gamma 10 CASH_i + \varepsilon_3$

(4) $INV = \delta 0 + \delta 1 LEV_i + \delta 2 DIV_i + \delta 3 REP_i + \delta 4 ROA_i + \delta 5 SIZE_i + \delta 6 GROWTH_i + \delta 7 DEPRC_i + \varepsilon_4$

As firms' capital structure, investment and payout decisions are expected to be long run decisions, we follow prior research and use cross sectional data. McCabe (1979) in particular reasons that the cross sectional method is more appropriate for investigating long-term relationships among variables.

Furthermore, each of the variables in equations (1) - (4) is represented by its four-year average. We use four-year averages for two reasons. Firstly, average values represent more closely the long-term nature of these key financial decisions (Adedeji, 1998). Moreover, share repurchases are irregular in nature compared to dividends. Therefore, an average value over a period is a more sensible measurement for the relationships under investigation (Adedeji, 1998). Secondly, as Adedeji (1998) points out, average values are considered to provide more reliable results than single point estimates since they can help alleviate measurement errors in the data stemming from distortions caused by random events; they also account better for slow adjustments.

The choice of control variables in each equation in the system satisfies the rank and order conditions of identification.

3.3.4 Proxy selection and definition

For the aforementioned variables in the model, we use the following proxies:

Regarding the leverage ratio, we use book values rather than market values. Barclay et al. (1995) highlight that corporate treasurers use book values in financial planning to prevent "distortions" from market price fluctuations. Furthermore, Jensen (1992) argues that book values give a more representative picture of a firm's obtained financing mix.

We choose Altman's Z Score as a proxy for firms' bankruptcy risk, as it is deemed to be a more 'complete' measure which considers more than one operational characteristic, rather than 'one dimensional' alternative proxies (such as the standard deviation of earnings). Frank and Goyal (2009) results indicate that the Altman's Z-score is one of the most reliable determinants of capital structure.

For the dividend equation, we use BETA as a measure of risk. Given the reluctance of managers to cut dividends and consequently the long-term nature of this decision, we expect dividend choice to relate to the firm's systematic risk. Thus, we choose Beta, which is a measure of the firm's systematic risk and closely associated with its operating and financial leverage.

As a profitability measure, we choose ROA over ROE because of the latter's sensitivity to leverage. We choose EBITDA as the numerator, however since EBITDA and EBIT are highly correlated, both can be suitable numerators.

The same applies for the highly correlated Sales and the Market Capitalization ratio as proxies for firm size, and Sales Growth and Market Capitalization Growth as proxies for growth opportunities. In this study, we use Sales as a proxy for firm size and Sales Growth as a proxy for growth opportunities. The choice of Sales Growth as a proxy for growth opportunities can be criticized as

a backward rather than forward-looking variable. However, the alternative proxy for forward looking growth expectations, the Market to Book ratio was subject to potential distortion during the credit crunch. During the credit-crunch, book values were influenced by rapid changes to accounting rules and share prices were affected by short-term financial stimuli, quantitative easing and falling interest rates, as well as a high level of uncertainty, which led to increased market volatility. This suggests that particularly during the period of 2008-09, market to book values might have been driven by factors only vaguely related to individual firm's growth prospects.

Finally, regarding Stock Options, most studies (Dittmar 2000; Young and Yang 2011) use the percentage of shares outstanding held in reserve to cover stock options as a proxy. We were not able to access this specific dataset. We therefore utilize the stock options expense available from Datastream as an alternative. As will be shown later, this proxy was found to have the expected positive and statistically significant effect on share repurchases, thus seeming to justify its selection.

To measure share repurchases we use the cash flow statement item from Datastream "*Purchases of common and preferred stock"* as this is deemed the most accurate share repurchase measurement (Banyi et al. 2008). Table 5 summarizes variable definitions.

The descriptive statistics for each variable are presented in Table 6.

Table 5 Definition of variables

Variable name	Variable acronym	Description
Leverage	LEV	Sum of long term debt plus short term debt scaled by total assets.
Dividend payout ratio	DIV	Common cash dividends scaled by net income after preferred dividends[18]
Share repurchase	REP	Share repurchase expenditure scaled by net income after preferred dividends
Investment	INV	Capital expenditure scaled by total assets
Profitability	ROA	Return on assets measured as EBITDA scaled by total assets
Cash balance	CASH	Cash and cash equivalents scaled by total assets
Free cash flow	FCF	Cash flow from operations scaled by total assets
Firm risk	BETA	Firm's market beta
Collateral	COLTRL	Assets that can be used as collateral measured as net property, plant and equipment scaled by total assets
Bankruptcy risk	ZSCORE	Altman's Z score calculated as $Z = 1.2\frac{Working\ Capital}{Total\ Assets} + 1.4\frac{Retained\ Earnings}{Total\ Assets} + 3.3\frac{EBIT}{Total\ Assets} + 0.6\frac{MarketValue\ of\ Equity}{Total\ Liabilities} + .999\frac{Sales}{Total\ Assets}$
Firm size	SIZE	Logarithm of sales
Growth opportunities	GROWTH	Sales Growth calculated as $logSALES_t - logSALES_{t-1}$
Depreciation	DEPRC	Depreciation scaled by total assets
Total stock return	RETURN	Stock's return calculated as the Log RI_{t+1} - $LogRI_t$, where RI is the stock's return index from Datastream. The return index presents the theoretical growth in value of a theoretical stock holding. This holding is deemed to return a daily dividend, which is used to purchase new units of the stock at the current price. The gross dividend is used. RI on the base date =100, then: $RI_t = RI_{t-1}*(Pi_t/PI_{t-1})*(1+D*N-1)$, Where: RI_t= return index on

[18] Negative net income observations are removed from the sample to ensure sensible payout observations.

		day t, RI_{t-1}= return index on previous day, PI_t= price index on day t, PI_{t-1} = price index on previous day, D= dividend yield % on day t, N = number of working days in the year (taken to be 260).
Stock options expense	OPTIONS	Stock options expense scaled by total assets
Stock liquidity	SLIQ	Annual trading volume scaled by the number of common shares outstanding

Table 6 Descriptive statistics-US sample

2005-2008					2008-2011					
Variable	Mean	Std. Dev.	Min	Max	Variable	Mean	Std. Dev.	Min	Max	Diff= mean(2005-08) - mean(2008-11), H_O Diff=0
DIV	0.21	0.20	0.00	0.69	DIV	0.25	0.21	0.00	0.68	-0.03***
REP	0.71	0.54	0.00	1.83	REP	0.54	0.39	0.00	1.33	-0.17***
INV	0.06	0.05	0.01	0.19	INV	0.05	0.04	0.01	0.15	0.01***
LEV	0.21	0.16	0.00	1.20	LEV	0.24	0.23	0.00	1.88	-0.02***
BETA	1.13	0.47	0.35	1.98	BETA	1.13	0.47	0.35	1.98	
GROWTH	0.05	0.04	-0.01	0.15	GROWTH	0.03	0.03	-0.03	0.09	0.02***
SIZE	6.88	0.50	6.04	7.79	SIZE	6.95	0.49	6.15	7.89	-0.07***
ROA	0.17	0.07	0.04	0.31	ROA	0.16	0.07	0.05	0.32	0.01***
RETURN	0.00	0.05	-0.11	0.10	RETURN	0.00	0.04	-0.09	0.09	0
CASH	0.14	0.13	0.01	0.45	CASH	0.15	0.13	0.02	0.45	-0.01***
FCF	0.13	0.05	0.05	0.25	FCF	0.13	0.05	0.05	0.25	0
SLIQ	2.59	1.43	1.06	6.40	SLIQ	3.22	1.38	1.51	6.45	-0.99***
DEPRC	0.04	0.02	0.01	0.08	DEPRC	0.04	0.02	0.01	0.08	0
ZSCORE	2.22	1.06	0.55	4.37	ZSCORE	2.19	1.04	0.63	4.39	0
COLTRL	0.26	0.20	0.05	0.74	COLTRL	0.26	0.21	0.04	0.76	0
OPTIONS	0.55	0.50	0.08	1.85	OPTIONS	0.56	0.49	0.10	1.86	0

LEV: Sum of long term debt plus short term debt scaled by total assets, DIV: Common cash dividends scaled by net income after preferred dividends, *REP*: Stock repurchases to (Net Income before Preferred Dividends - Preferred Dividend Requirement), *INV*: capital expenditures to total assets, *ROA*: EBITDA to total assets, *FCF*: cash flow from operations scaled by total assets, CASH: cash and cash equivalents to total assets, *BETA*: stock's beta, *COLTRL*: net property, plant and equipment to total assets, *ZSCORE*: Altman's Z score, *SIZE*: logarithm of sales, *GROWTH*: sales growth (logSALESt – logSALESt-1), *DEPRC*: depreciation to total assets, *RETURN*: stock's return calculated as the Log RI year1 -LogRI year0, where RI is the stock's return index from Datastream, *OPTIONS*: Stock options expense to total assets.

Before estimating the model we examine if the data follow the normal distribution since normality is a basic assumption of OLS, 2SLS and 3SS methodology. Table 7 shows the results of the three normality tests. The null hypothesis for first two is that the skewness and kurtosis of the sample data is

that of a normal distribution. The third test combines the two statistics in an overall test statistic similar to the Jarque-Bera normality test. The normality tests results suggest a non-normal distribution of our data. In order to deal with this we use three measures.

As a first measure we winsorize[19] the data at the conventional 5% level to deal with potential outliers before using OLS, 2SLS and 3SLS estimation. Secondly, we use two alternative non-parametric estimation techniques, median regression and regression with bootstrapped standard errors. Hao and Naiman (2007) point out that median-regression estimation, similar to conditional-mean-regression modelling, can represent the relationship between the central location of the response and a set of covariates. Furthermore, Hao and Naiman (2007) argue that in cases like our own, when the distribution of the data is substantially skewed, the mean is not appropriate for interpretation while the median remains highly informative. Therefore, conditional-median estimations are more practical.

As an additional alternative, we use regression estimations with bootstrapped standard errors. Guan (2003) and Fox (2008) underline that regression estimations with bootstrapped standard errors do not require distributional assumptions such as the residuals to be normally distributed and in addition it can provide more accurate inferences. This method is based upon resampling the regression's residuals in order to approximate their underlying distribution rather than assuming it (e.g normal distribution). Non-parametric estimations deal with the non-normality of our data; however, they do not deal with the

[19] Regression results from the winsorized data have produced more statistically significant variables and higher R-squares compared results from to the non-winsorized data confirming the distortion from outliers.

endogeneity expected to be present in our system of equations.

We also test for multicollinearity. Tables 16-19 present the VIF [20]factors for each of the variables in the dividend, share repurchases, investment and leverage regressios for the 2005-08 and 2008-11 periods respectively. Results indicate no multicollinearity problems. The relevant rule of thumb suggests that if a variable has a VIF factor greater than 10 the variable may merit further investigation, Gujarati (2004). These variables have a max of 3.94.

Furthermore, in order to establish the validity of the instruments we employ two instrument tests. We use the Cragg-Donald Wald test for weak identification. Weak identification arises when the excluded instruments are weakly correlated with the endogenous regressors. Consequently, estimators can perform poorly. Low values of the Cragg-Donald Wald F-statistic (i.e lower than 10) indicate weak instruments (Stock and Yogo 2005). In addition, we use the Sargan test for overidentifying restrictions. The null hypothesis is that all instruments are valid i.e., uncorrelated with the error term. If the computed chi-square exceeds the critical chi-square value, we reject the null hypothesis, which means that at least one instrument is correlated with the error term and therefore the estimates based on the chosen instruments are not valid. Table 9 presents the instrumental variable tests' results for each 2SLS regression.

The weak identification test, as it can be seen from Table 15, indicates that we have a weak instrument problem, in every regression, in both periods. The Cragg-Donald Wald F-statistic is quite low ranging from 1.13 in the investment regression in 2005-08 to 5.22 in the dividend regression in 2005-08. Stock and Yogo (2005) report that, as a rule of thumb Cragg-Donald Wald F-

[20] VIF factors have been calculated from OLS estimations.

statistics below 10 indicate weak instruments. In addition, Sargan test's results indicate that the instruments are correlated with the error term in most of the regressions. The exception being the share repurchases and leverage equations in 2005-08 and the share repurchases equation in 2008-11.

The instrumental variables tests cast doubt on instrument validity. The problem of weak instruments is common in similar studies. Most studies which employ instrumental variables do not report tests regarding their validity (see Jensen et al. 1992; Noronha et al. 1996; Adedeji 1998; Crutchley et al. 1999; Ding and Murinde 2010, Aggarwal and Kyaw 2010). Furthermore, regression results from some of the aforementioned studies indicate weak instrument problems. A typical example is in Jensen (1992) where the variable fixed assets, serving as an instrument for leverage, is not statistically significant in the leverage equation[21]. Similar cases are reported in the majority of the aforementioned studies. However, instrument validity is not usually discussed or tested. This might be due to the difficulty of finding valid instruments underlined by Gujarati (2004).

Invalid instruments can produce poorer results than OLS as the relevant 2SLS and 3SLS estimators can have large standard errors and large asymptotic bias (Woolridge 2006). Therefore, I consider both the results from the OLS regressions and the non-parametric regression to consider the robustness of the results. Non-parametric estimations, are expected to produce more valid results than OLS as they deal with non-normality issues in our data.

[21] The authors investigate simultaneity between leverage, dividends, insider and institutional ownership in two periods 1982 and 1987. Fixes assets is statistically insignificant in the 1987 estimations.

Table 7 Normality Tests-US sample

	2005-08					2008-11			
Variable	Obs	Pr(Skewness)	Pr(Kurtosis)	Prob>chi2	Variable	Obs	Pr(Skewness)	Pr(Kurtosis)	Prob>chi2
BETA	272	0.59	0.00	0.00	BETA	272	0.59	0.00	0.00
DIV	272	0.00	0.48	0.00	DIV	272	0.01	0.00	0.00
ROA	272	0.63	0.01	0.03	ROA	272	0.00	0.42	0.01
DEPR	272	0.00	0.27	0.00	DEPR	272	0.00	0.25	0.00
INV	272	0.00	0.00	0.00	INV	272	0.00	0.00	0.00
COLTRL	272	0.00	0.79	0.00	COLTRL	272	0.00	0.48	0.00
LEV	272	0.02	0.00	0.00	LEV	272	0.01	0.03	0.01
REP	272	0.00	0.00	0.00	REP	272	0.01	0.00	0.00
RETURN	272	0.31	0.10	0.15	RETURN	272	0.98	0.06	0.17
OPTION	272	0.00	0.01	0.00	OPTION	272	0.00	0.01	0.00
CASH	272	0.00	0.56	0.00	CASH	272	0.00	0.69	0.00
FCF	272	0.01	0.00	0.00	FCF	272	0.00	0.09	0.00
SIZE	272	0.25	0.00	0.00	SIZE	272	0.05	0.00	0.00
GROWTH	272	0.00	0.30	0.00	GROWTH	272	0.00	0.81	0.01
SLIQ	272	0.00	0.02	0.00	SLIQ	272	0.00	0.66	0.00
ZSCORE	272	0.03	0.00	0.00	ZSCORE	272	0.00	0.02	0.00

LEV: Sum of long term debt plus short term debt scaled by total assets. , DIV: Common cash dividends scaled by net income after preferred dividends, *REP*: Stock repurchases to (Net Income before Preferred Dividends - Preferred Dividend Requirement), *INV*: capital expenditures to total assets, *ROA*: EBITDA to total assets, *FCF*: cash flow from operations scaled by total assets, CASH: cash and cash equivalents to total assets, *BETA*: stock's beta, *COLTRL*: net property, plant and equipment to total assets, *ZSCORE*: Altman's Z score, *SIZE*: logarithm of sales, *GROWTH*: sales growth (logSALESt – logSALESt-1), *DEPRC*: depreciation to total assets, *RETURN*: stock's return calculated as the Log RI year1 -LogRI year0, where RI is the stock's return index from Datastream, *OPTIONS*: Stock options expense to total assets

3.4 Findings and Analysis

3.4.1 Non-parametric estimations

Tables 10-12 report the non-parametric estimation results.

Both the median and the bootstrapping regression show that share repurchases do have an impact on investment, as the respective coefficient is statistically insignificant in both periods. This suggests that, all else equal, when firms increase their share repurchase payouts they invest less and vice versa. This supports concerns that share repurchases might limit the availability of firms to engage in productive investment (FINNOV, 2012).

The non-parametric results show moderate support towards dividend substitution. The coefficient of share repurchases in the dividend regressions is generally negative however; it is statistically significant only in the median regression in 2008-11. However, as it will be shown later the aforementioned coefficient is consistently negative and statistically significant in both periods in the OLS, 2SLS and 3SLS estimations providing additional support to the dividend substitution hypothesis.

The influence of share repurchases on investment and on dividends is in accordance with the Budget Constraint Theory of McCabe (1979) where share repurchases as a use of funds have a negative impact on other uses of funds (i.e investment and dividends).

There are also signs that share repurchases have a positive effect on leverage however this is statistically significant only in the bootstrapping estimations in 2005-8 and in the median estimations in 2008-11. Again this is in line to the

Budget Constraint Theory of McCabe (1979) where share repurchases as a use of funds have a positive impact on sources of funds (i.e. debt financing).

The effect of dividends on investment is consistent between periods. Dividends exhibit a negative and statistically significant impact on investment in both periods according to both non-parametric estimations methods.

Dividends seem to impact on share repurchases. According to both non-parametric estimations in 2005-08, dividends' effect on share repurchases is statistically significant and negative. This is supportive of the dividend substitution hypothesis by Grullon and Michaely (2002). In 2008-11, the relevant coefficient is still negative but statistically insignificant.

Finally, the effect of dividends on leverage is not consistent between periods and estimation techniques. Only in 2005-08 and in the median regression dividends have a positive effect on leverage. This supports the Budget Constraint Theory of McCabe (1979) as a greater use of dividends leads to a greater use in debt financing. It is also supportive of the Pecking Order theory, which suggests that firms with higher dividend payout ratios will have lower retained earnings and thus need to rely more on debt financing to fund investment opportunities. In 2008-11, the coefficient on dividends is insignificant in both the median and the bootstrapping estimations.

Leverage does not seem to impact on investment. The coefficient of the leverage variable in the investment equation is statistically insignificant it both periods and across both non-parametric estimation techniques. The effect of leverage on dividends seems to be positive. However, only according to the median estimations this positive effect is statistically significant effect on dividends in 2005-08. However, in the bootstrapping estimations this effect is

statistically insignificant. This is in accordance to the Budget Constraint Theory of McCabe (1969) where sources of funds have a positive impact on uses of funds.

Investment has a robust negative impact on dividends in both periods. In support of the Budget Constraint theory, the coefficient of the investment variable in the dividend non-parametric regressions is always negative and statistically significant. In addition, investment seems to have a negative impact on share repurchases. However, this impact seems to be statistically significant only in the bootstrapping estimations.

Regarding the control variables, findings are in accordance to earlier research. Free cash flows show a consistent, positive and statistically significant effect on share repurchases. This is in line with Free Cash Flow Theory. Similar results are reported by earlier studies (see Dittmar 2000; Oswald and Young 2008; Dixon et al. 2008; Dhanani and Roberts 2009). Moreover, the findings confirm the significance of stock options. The coefficient on stock options is consistently positive and statistically significant supporting the option funding hypothesis of Kahle (2000). In addition, growth opportunities seem to have a consistent negative effect on share repurchases. US firms appear to reduce share repurchases in the presence of growth opportunities. This is in line to Rozeff (1982) and Crutchley et al (1999) who suggest that firms with growth opportunities are likely to retain earnings instead of distributing them in order to avoid the costs of external financing. Regarding the stock return variable it is negative and statistical significant only in the 2005-08. This is in support of the undervaluation motive as in Dittmar (2000). We find no evidence of cash and stock liquidity to have a consistent effect on share repurchases.

In the dividend regressions, the findings show that free cash flows (FCF) and profitability (ROA) are significant dividend determinants. These variables have respectively a consistent negative and positive effect on dividends. The positive effect of profitability on dividends is in line with Pecking Order Theory. However, US firms do not seem to distribute free cash flows via dividend payouts. Firm risk has the expected negative effect on dividends however, this is statistically significant only in the median estimations. In addition, growth opportunities (GROWTH) are not consistently negatively related to dividends. Finally, firm size does not have a statistically significant effect on dividends.

In the leverage regressions, non-parametric estimations indicate that bankruptcy risk (ZSCORE), firm size (SIZE) and free cash flows are significant capital structure determinants. Bankruptcy risk has a negative impact while size a positive one. These relationships are in line with the Trade Off theory. This result is in accordance to Frank and Goyal (2009) who argue that Altman's Z-score is one of the most reliable capital structure determinants. In addition, non-parametric estimations suggest that collateral (COLTRL) has as significant effect on capital structure. Collateral (COLTRL) is positive and statistically significant in both bootstrapping and median estimations. Jensen (1976) argues that firms with tangible assets can use them as collateral when a firm is taking on debt, thus reducing debt’s agency costs. Profitability, growth opportunities and size do not seem to have a consistent effect on capital structure.

In the investment equation profitability, growth opportunities and depreciation seem to have the expected positive effect on investment. The positive effect of profitability on investment is in accordance to McCabe (1979) who argues that

sources of funds (earnings) have a positive effect on uses of funds (investment). In addition, McCabe (1979) suggests that depreciation identifies cash flows, which can be used to fund investment. This finding is also in line to Abel and Eberly (2012) who argue that, as the depreciation rate reflects the users' cost of capital, investment is a linear function of the depreciation rate. Firm size and growth opportunities do not seem to have an effect on investment.

3.4.2 Parametric estimations

Table 13-15 presents the OLS, 2SLS and 3SLS results regarding the relationships between share repurchases, dividends, investment and capital structure.

In general, the employed methodologies have produced generally similar results with a few differences regarding interactions between financial decisions. Results differ mainly between methods, which deal with endogeneity (2SLS, 3SLS), and methods which do not (OLS, median regression, regression with bootstrapped standard errors).

The results indicate that share repurchases do have an effect on investment, dividends and leverage for both the period before and after the credit crunch. Considering the reverse relationship between investment and share repurchases we also find an equally robust negative relationship for both periods. This suggest that, ceteris paribus, when firms engage more in share repurchases they tend to invest less and vice versa. This suggests that concerns that market pressure for share repurchases might limit the availability of firms to engage in productive investment (FINNOV, 2012) might be substantiated. However, the fact that growth opportunities (GROWTH) are

related consistently and negatively to share repurchases mitigates these concerns to some extent. It appears that managers do not starve their firms of opportunities to engage in positive revenue development in order to fund share repurchases.

The results also consistently indicate that share repurchases have a negative effect on dividends for both, the period before and after the credit crunch. With the exception of the 2SLS regression for the 2008-11 period we also find a statistically negative impact of dividends on share repurchases for both periods. These findings therefore provide further evidence for dividend and share repurchase substitution (Grullon and Michaely 2002; Jiang et al. 2013; Kulchania 2013).

While the research suggests a consistently significant negative impact of investment on dividends, interestingly, with regard to the impact of dividends on investment, we only establish a statistically significant negative relationship in the period of 2005-2008. After the credit crunch, many firms were reluctant to invest due to uncertainties about the timing and pace of the economic recovery. While in many firms this lead to surplus cash accumulation, managers are likely to have been reluctant to reduce the cash surplus by increasing dividends due to their sticky nature (Jensen 1986) and the intention to expand investment once the economic recovery had stabilized.

Overall, these results suggest that financial decisions about share repurchases, dividends and investment are interrelated in line with Pecking Order and Free Cash Flow theory. The findings therefore support the validity of the extension of earlier research e.g. by McCabe (1979) and Adedeji (1998) by including share repurchases rather than merely dividends when considering firms' pay-out and investment policies. The results provide further support for McCabe's

(1979) Budget Constraint Hypothesis, which suggests that payout policies and investment are competing uses of funds.

In line with Free Cash Flow theory, we find that free cash flow is consistently positively and sales growth consistently negatively related to share repurchases. This suggests that firms with limited growth opportunities utilize share repurchases to return surplus funds to investors. In general, these results confirm previous evidence regarding the main determinants of share repurchases (see Dittmar 2000; Dixon et al. 2008; Dhanani and Roberts 2009; Young and Yang 2011).

With regard to the relationship between capital structure and pay-out policies and investment we do not find any statistically significant impact of leverage on investment. With regard to the impact of leverage on share repurchases only the 3SLS estimation for the period of 2005-2008 indicates a clear statistically positive relationship. Concerning the impact of investment and share repurchases on leverage, only the 3SLS estimation for the period of 2005-2008 indicates a clear statistically positive relationship.

By contrast, we find consistent evidence for a statistically significant positive impact of leverage on dividends which holds across periods and estimation techniques. With the exception of the OLS regression for the period 2008-2011, the findings also consistently suggest a statistically significant positive impact of dividends on leverage. The positive relationship between dividends and leverage suggests that both mechanisms are complementary, rather than substitutive, i.e. firms with higher (lower) leverage also tend to have higher (lower) dividend payout ratios and vice versa. However, this relationship cannot be explained by agency theoretical considerations, which suggest that managers respond to market pressures to reduce free cash flow by increasing

leverage and returning cash to investors via dividends (Jensen, 1986), as in this case one would expect free cash flows (FCF) to have a statistically significant positive relationship with both leverage and dividends. By contrast, the findings suggest a significant negative relationship between free cash flows and leverage and no statistically significantly impact of free cash flow on dividends. The negative relationship between free cash flows and leverage supports the contention of Pecking Order theory that ceteris paribus managers prefer to use internally generated funds over external finance.

Table 8 Summary of Non-parametric (median and bootstrapping) estimation results - Dependent variables, US sample

2005-2008		Median regression				Bootstrapping regression			
		INV	DIV	REP	LEV	INV	DIV	REP	LEV
Independent variables	INV		-1.93***	-0.29	-0.88**		-1.82***	-8.34***	-0.74***
	DIV	-0.010***		-0.19***	0. 15***	-0.02**		-2.67***	-0.01
	REP	-0.01***	-0. 01		0.01	-0.02***	0.01		0.13**
	LEV	0.01	0.13*	0.64***		0.01	0.85	0.23	
2008-11		Median regression				Bootstrapping regression			
		INV	DIV	REP	LEV	INV	DIV	REP	LEV
Independent variables	INV		-1.75***	--0.01	-0.78***		-2.62***	-0.83*	-0.70*
	DIV	-0.01*		-0.07	-0.02	-0.01		-0.02	-0.01
	REP	-0.01***	-0.06**		0.05**	-0.03***	-0.02		0.03
	LEV	0.01	0.12**	0.18		0.01	0.02	0.02*	
	No. observations	272	272	272	272	272	272	272	272

***, **, *** indicate statistical significance at 10%, 5%, 1% level respectively**

LEV: long term debt to total assets (book values), *DIV*: dividend payout (Common Dividends (Cash) to (Net Income before Preferred Dividends - Preferred Dividend Requirement), *REP*: Stock repurchases to (Net Income before Preferred Dividends - Preferred Dividend Requirement), *INV*: capital expenditures to total assets,

Table 9 Summary of Non-parametric (median and bootstrapping) estimation results - Control variables 2005-08, US sample

		Dependent Variables							
2005-2008		Median regression				Bootstrapping regression			
		INV	DIV	REP	LEV	INV	DIV	REP	LEV
Independent variables	GROWTH	0.17***	-0.01	-4.01***	0.16	0.19***	-0.19	-0.46	0.03
	SIZE	-0.01	0.01	-0.01	-0.01	-0.01	0.02	-0.12*	-0.01
	ROA	0.02	1.54***		0.19	0.05*	1.68***		0.04
	FCF		-2.18***	3.1***	-0.85***		-2.07**	2.53***	-0.71***
	COLTLR				0.19***				0.15***
	ZSCORE				-0.03***				-0.02**
	BETA		-0.03*				-0.02		
	OPTIONS			0.18***				0.10	
	RETURN			-1.54***				-2.72***	
	CASH			0.03				0.20	
	SLIQ			-0.05*				-0.03	
	DEPRC	1.34***				0.97**			
	constant	-0.02	0.12	0.61	0.32**	0.04	-0.12	1.54***	0.35***
	No. observations	272	272	272	272	272	272	272	272
	R-squared	0.30	0.23	0.16	0.21	0.37	0.31	0.20	0.38

ROA: EBITDA to total assets, *FCF*: cash and cash equivalents to total assets, *BETA*: stock's beta, *COLTRL*: net property, plant and equipment to total assets, *ZSCORE*: Altman's Z score, *SIZE*: logarithm of sales, *GROWTH*: sales growth (logSALESt – logSALESt-1), *DEPRC*: depreciation to total assets, *RETURN*: stock's return calculated as the Log RI year1 -LogRI year0, where RI is the stock's return index from Datastream, *OPTIONS*: Stock options expense to total assets, SLIQ: annual trading volume to number of common shares outstanding

Table 10 Summary of Non-parametric (median and bootstrapping) estimation results - Control variables 2008-11, US sample

2008-2011		Dependent Variables							
		Median regression				Bootstrapping regression			
		INV	DIV	REP	LEV	INV	DIV	REP	LEV
Independent variables	GROWTH	0.10***	-0.92***	-2.08**	-0.46*	0.08	-0.87	-2.53***	-0.67*
	SIZE	0.01	-0.01	-0.01	0.11**	-0.01	-0.06	-0.10**	0.11***
	ROA	0.04***	1.20***		0.14	0.01	1.23***		0.14
	FCF		-2.32***	2.84***	-0.68**		-3.37***	2.18***	-0.72***
	COLTLR				0.14**				0.15*
	ZSCORE				-0.04***				-0.03
	BETA		-0.68***				-0.02		
	OPTIONS			0.16 **				0.13**	
	RETURN			0.53				0.15	
	CASH			-0.41				0.43	
	SLIQ			-0.03				-0.02	
	DEPRC	1.07***				0.84***			
	constant	-0.02	0.44**	0.42	-0.42***	0.09**	0.90**	1.29***	-0.46**
	No. observations	272	272	272	272	272	272	272	272
	R-squared	0.22	0.22	0.16	0.19	0.29	0.17	0.18	0.22

ROA: EBITDA to total assets, *FCF*: cash and cash equivalents to total assets, *BETA*: stock's beta, *COLTRL*: net property, plant and equipment to total assets, *ZSCORE*: Altman's Z score, *SIZE*: logarithm of sales, *GROWTH*: sales growth (logSALESt – logSALESt-1), *DEPRC*: depreciation to total assets, *RETURN*: stock's return calculated as the Log RI year1 -LogRI year0, where RI is the stock's return index from Datastream, *OPTIONS*: Stock options expense to total assets, SLIQ: annual trading volume to number of common shares outstanding.

Table 11 Summary of OLS,2SLS and 3SLS regression statistics - Dependent variables, US sample

2005-2008		Dependent Variables											
		OLS				2SLS				3SLS			
		INV	DIV	REP	LEV	INV	DIV	REP	LEV	INV	DIV	REP	LEV
Independent variables	INV		-0.75***	-3.30***	-0.24		-1.23**	-3.57***	0.69		-2.86***	-8.34***	2.20***
	DIV	-0.03***		-0.48***	0.12***	-0.10*		-1.58*	0. 40*	-0.15***		-2.67***	0.84***
	REP	-0.02***	-0.06***		0.01	-0.07***	-0. 21**		0.17	-0.08***	-0.38***		0.36***
	LEV	0.01	0.25***	0.07		0.03	0.54*	1.01		0.05	0.69***	1.90***	
2008-2011													
		INV	DIV	REP	LEV	INV	DIV	REP	LEV	INV	DIV	REP	LEV
Independent variables	INV		-0.60*	-3.17***	0.11		-0.98*	-3.27***	4.30*		-2.00***	-5.90***	2.90*
	DIV	-0.01		-0.21*	0.08	0.02		-0.65	0.68**	-0.02		-1.40***	0.91***
	REP	-0.02***	-0.08***		0.06*	-0.09***	-0.27***		0.05	-0.12***	-0.42***		0.11
	LEV	0.01	0.10*	0.18*		-0.02	0.26*	0.01		-0.02	0.38***	0.35	
	No. observations	272	272	272	272	272	272	272	272	272	272	272	272

***, **, *** indicate statistical significance at 10%, 5%, 1% level respectively**

LEV: long term debt to total assets (book values), *DIV*: dividend payout (Common Dividends (Cash) to (Net Income before Preferred Dividends - Preferred Dividend Requirement), *REP*: Stock repurchases to (Net Income before Preferred Dividends - Preferred Dividend Requirement), *INV*: capital expenditures to total assets.

Table 12 Summary of OLS, 2SLS and 3SLS regression statistics - Control variables 2005-08, US sample

		Dependent variables											
2005-2008		OLS				2SLS				3SLS			
		INV	DIV	REP	LEV	INV	DIV	REP	LEV	INV	DIV	REP	LEV
Independent variables	GROWTH	0.26**	-1.80***	-4.06***	-0.85**	-0.07	-1.90***	-5.35***	0.15	-0.23*	-1.90***	-5.77***	1.39**
	SIZE	0.01	0.03	-0.12**	-0.01	-0.01	0.02	-0.06	0.01	-0.01	-0.01	-0.02	0.01
	ROA	0.04	0.60***		0.07***	0.11*	0.17		0.68	0.11***	0.09		0.36
	FCF		-0.01	2.26***	-1.67***		0.19	3.73***	-2.50***		0.03**	4.49**	-2.66***
	COLTLR				0.16**				0.10				0.09
	ZSCORE				-0.05***				-0.03**				-0.01*
	BETA		-0.06***				-0.03				-0.01		
	OPTIONS			0.23***				0.15				-0.02	
	RETURN			-1.84***				-1.85***				-0.37	
	CASH			-0.18				0.08				0.05	
	SLIQ			-0.02				-0.05*				-0.02	
	DEPRC	1.51***				1.38***				0.94***			
	constant	-0.13	0.06	1.70***	0.44***	0.08	0.11	1.32***	0.13	0.12**	0.42*	1.98***	-0.20
	No. observations	272	272	272	272	272	272	272	272	272	272	272	272
	R-squared	0.54	0.32	0.35	0.31	-	-	-	-	-	-	-	-

ROA: EBITDA to total assets, *FCF*: cash and cash equivalents to total assets, *BETA*: stock's beta, *COLTRL*: net property, plant and equipment to total assets, *ZSCORE*: Altman's Z score, *SIZE*: logarithm of sales, *GROWTH*: sales growth (logSALESt – logSALESt-1), *DEPRC*: depreciation to total assets, *RETURN*: stock's return calculated as the Log RI year1 -LogRI year0, where RI is the stock's return index from Datastream, *OPTIONS*: Stock options expense to total assets, SLIQ: annual trading volume to number of common shares outstanding.

Table 13 Summary of OLS, 2SLS and 3SLS regression statistics - Control variables 2008-11, US sample

		Dependent variables											
2008-2011		OLS				2SLS				3SLS			
		INV	DIV	REP	LEV	INV	DIV	REP	LEV	INV	DIV	REP	LEV
Independent variables	GROWTH	0.13**	-2.47***	-2.65***	-1.58***	0.02	-2.64***	-3.87**	-0.62	-0.15	-2.52***	-3.97***	0.35
	SIZE	-0.01	0.03	-0.05	0.14**	-0.01	-0.01	-0.02	0.11***	-0.01	-0.02	-0.05	0.09**
	ROA	0.05**	0.41		1.16***	0.07	0.25		0.59	0.07*	0.01		0.50
	FCF		-0.13	1.84***	-1.26***		0.45	2.00**	-1.05**		0.11***	2.00***	-1.56***
	COLTLR		-		0.09				-0.45				-0.25
	ZSCORE				-0.10***				-0.08***				-0.06***
	BETA		-0.08				-0.10***				-0.04		
	OPTIONS			0.26***				0.22 ***				-0.06	
	RETURN			0.23				0.38				-0.37	
	CASH			-0.68**				-0.73**				0.09	
	SLIQ			-0.01				-0.02				-0.01	
	DEPRC	1.19***				1.24***				0.81***			
	constant	0.02	0.17***	0.88**	-0.64***	0.09**	0.47*	0.94**	-0.58**	0.15***	0.56***	1.39***	-0.52**
	No. observations	272	272	272	272	272	272	272	272	272	272	272	272
	R-squared	0.50	0.22	0.30	0.35	-	-	-	-	-	-	-	-

ROA: EBITDA to total assets, *FCF*: cash and cash equivalents to total assets, *BETA*: stock's beta, *COLTRL*: net property, plant and equipment to total assets, *ZSCORE*: Altman's Z score, *SIZE*: logarithm of sales, *GROWTH*: sales growth (logSALESt – logSALESt-1), *DEPRC*: depreciation to total assets, *RETURN*: stock's return calculated as the Log RI year1 -LogRI year0, where RI is the stock's return index from Datastream, *OPTIONS*: Stock options expense to total assets, SLIQ: annual trading volume to number of common shares outstanding.

Table 14 Instrumental variables overidentification and weak identification test - US sample

	2005-08	
	Overidentification test for all instruments -Sargan statistic (p-values)	Weak identification test - Cragg-Donald Wald F statistic
REP	0.43	1.41
DIV	0.03	5.22
INV	0.00	1.13
LEV	0.29	1.24
	2008-11	
REP	0.40	3.06
DIV	0.03	3.05
INV	0.03	2.20
LEV	0.00	1.43

* The null hypothesis for the overidentification test is that instruments are valid

* As a rule of thumb Cragg-Donald Wald F-statistics below 10 indicate weak instruments (Stock and Yogo, 2005)

Table 15 Dividend regressions (2005-08, 2008-11) VIF factors

VIF		
Variable	2005-08	2008-11
FCF	3.38	3.34
ROA	2.88	3.21
GROWTH	1.46	1.26
REP	1.39	1.24
INV	1.35	1.23
LEV	1.34	1.21
SIZE	1.18	1.2
BETA	1.12	1.14
Mean VIF	1.76	1.73

LEV: Sum of long term debt plus short term debt scaled by total assets., DIV: Common cash dividends scaled by net income after preferred dividends, *REP*: Stock repurchases to (Net Income before Preferred Dividends - Preferred Dividend Requirement), *INV*: capital expenditures to total assets, *ROA*: EBITDA to total assets, *FCF*: cash flow from operations scaled by total assets, CASH: cash and cash equivalents to total assets, *BETA*: stock's beta, *COLTRL*: net property, plant and equipment to total assets, *ZSCORE*: Altman's Z score, *SIZE*: logarithm of sales, *GROWTH*: sales growth (logSALESt – logSALESt-1), *DEPRC*: depreciation to total assets, *RETURN*: stock's return calculated as the Log RI year1 -LogRI year0, where RI is the stock's return index from Datastream, *OPTIONS*: Stock options expense to total assets

Table 16 Share repurchases regressions (2005-08, 2008-11) VIF factors

VIF		
Variable	2005-08	2008-11
CASH	2.46	2.67
OPTION	2.37	2.63
FCF	2.11	2.17
GROWTH	1.88	1.49
INV	1.47	1.45
LEV	1.45	1.37
DIV	1.42	1.31
LIQ	1.38	1.3
RETURN	1.35	1.24
SIZE	1.24	1.23
Mean VIF	1.71	1.69

LEV: Sum of long term debt plus short term debt scaled by total assets., DIV: Common cash dividends scaled by net income after preferred dividends, *REP*: Stock repurchases to (Net Income before Preferred Dividends - Preferred Dividend Requirement), *INV*: capital expenditures to total assets, *ROA*: EBITDA to total assets, *FCF*: cash flow from operations scaled by total assets, CASH: cash and cash equivalents to total assets, *BETA*: stock's beta, *COLTRL*: net property, plant and equipment to total assets, *ZSCORE*: Altman's Z score, *SIZE*: logarithm of sales, *GROWTH*: sales growth (logSALESt – logSALESt-1), *DEPRC*: depreciation to total assets, *RETURN*: stock's return calculated as the Log RI year1 -LogRI year0, where RI is the stock's return index from Datastream, *OPTIONS*: Stock options expense to total assets

Table 17 Investment regressions (2005-08, 2008-11) VIF factors

VIF		
Variable	2005-08	2008-11
GROWTH	1.64	1.36
DIV	1.39	1.23
ROA	1.32	1.23
LEV	1.24	1.22
SIZE	1.19	1.12
DEPR	1.16	1.06
REP	1.16	1.06
Mean VIF	1.3	1.18

LEV: Sum of long term debt plus short term debt scaled by total assets., DIV: Common cash dividends scaled by net income after preferred dividends, *REP*: Stock repurchases to (Net Income before Preferred Dividends - Preferred Dividend Requirement), *INV*: capital expenditures to total assets, *ROA*: EBITDA to total assets, *FCF*: cash flow from operations scaled by total assets, CASH: cash and cash equivalents to total assets, *BETA*: stock's beta, *COLTRL*: net property, plant and equipment to total assets, *ZSCORE*: Altman's Z score, *SIZE*: logarithm of sales, *GROWTH*: sales growth (logSALESt – logSALESt-1), *DEPRC*: depreciation to total assets, *RETURN*: stock's return calculated as the Log RI year1 -LogRI year0, where RI is the stock's return index from Datastream, *OPTIONS*: Stock options expense to total assets

Table 18 Leverage regressions (2005-08, 2008-11) VIF factors

VIF		
Variable	2005-08	2008-11
ROA	3.94	3.85
INV	3.68	3.82
COLTRL	3.09	3.45
FCF	2.99	3.28
ZSCORE	2	1.87
GROWTH	1.68	1.37
REP	1.44	1.26
DIV	1.43	1.23
SIZE	1.35	1.18
Mean VIF	2.4	2.37

LEV: Sum of long term debt plus short term debt scaled by total assets., DIV: Common cash dividends scaled by net income after preferred dividends, *REP*: Stock repurchases to (Net Income before Preferred Dividends - Preferred Dividend Requirement), *INV*: capital expenditures to total assets, *ROA*: EBITDA to total assets, *FCF*: cash flow from operations scaled by total assets, CASH: cash and cash equivalents to total assets, *BETA*: stock's beta, *COLTRL*: net property, plant and equipment to total assets, *ZSCORE*: Altman's Z score, *SIZE*: logarithm of sales, *GROWTH*: sales growth (logSALESt – logSALESt-1), *DEPRC*: depreciation to total assets, *RETURN*: stock's return calculated as the Log RI year1 -LogRI year0, where RI is the stock's return index from Datastream, *OPTIONS*: Stock options expense to total assets

3.5 Conclusion

This study investigates the effect of share repurchases on other key financial decisions and the resulting interactions for a sample of S&P 500 companies. Despite the increasing popularity of share repurchases, such a study has previously been missing from the literature, so that the impact of share repurchases on other key financial policies, and particularly on investment, remained unaddressed. Following relevant theoretical considerations and prior empirical evidence, this study is the first to introduce share repurchases as an endogenous variable in a system of equations to simultaneously assess four key financial decisions, namely share repurchases, dividends, leverage and investment.

The research finds clear evidence that share repurchases have become an integral part of large US firms' financial decision-making. The fact that share repurchases are not merely driven by free cash flows but also by decisions about investment and dividends, and that both dividends and investments are in turn affected by repurchases, indicates that share repurchases have become an essential consideration when managers in large US firms take financial decisions.

The fact that these results hold both for the period before and subsequent to the credit crunch suggests that, while firms' overall pay-out ratios fell, in general the credit crunch did not lead managers to marginalize share repurchases over dividend payments or vice versa. The substitution effect between dividends and share repurchases is evident both for the period prior to and after the credit crunch.

Our findings are expected to be of interest to academics and regulators this research is the first to provide empirical support to concerns that share repurchases might undermine managers' ability to engage in investment (Lazonick 2008; FINNOV 2012). However, the fact that growth opportunities are related consistently and negatively to share repurchases mitigates these concerns to some extent.

Our findings regarding the relationship between leverage, dividends and free cash flows suggest that managers prefer to use internally generated funds over new debt or equity, as suggested by Pecking Order Theory in both periods.

In addition, this study is of importance to academics from a methodological point of view. Given the clear evidence of interdependence in financial decision-making, our results provide further support for recommendations by previous researchers (see McCabe 1979, Adedeji 1998, Aggarwal and Kyaw 2010) regarding the need for joint investigation of financial policies and consequently the employment of simultaneous equation techniques in order to avoid model misspecification (De Angelo and De Angelo, 2007).

Our findings appear robust against a number of different estimations techniques. More specifically, we have employed both parametric (OLS, 2SLS, 3SLS) and non-parametric estimations (median regressions and regressions with bootstrapped standard errors). Our instrumental variables appear to be weak in every equation and hence the 2SLS and 3SLS may perform poorly (see Gujarati 2004; Stock and Yogo 2005). Thus, we based our conclusions on our non-parametric estimations. Nevertheless, we did not observe significant discrepancies between different estimation methods, which suggest that our findings are robust.

The integration of share repurchases into financial decision-making, according to the findings, seems quite robust for US firms. However, might not be generalizable since a different institutional setting might produce different results. Therefore, in the next chapter I plan to investigate the integration of share repurchases into the UK. The UK is the ideal market to further this study because of two reasons. First, share repurchases are comparatively well established in the UK. Secondly, as it will be explained in the next chapter, the UK displays a number of differences compared to the US regarding its institutional and regulatory environment.

4. Are share repurchases an integral part of UK firms' financial decision-making?

4.1 Introduction

As identified in the previous chapter, our research findings suggest that in US firms financial decisions regarding capital structure, dividends, share repurchases and investment are closely related. The documented negative interaction between share repurchases and investment is of particular interest to policymakers and shareholders as it supports economists' concerns that share repurchases might undermine productive investment (see Laurent 2015; FINNOV 2012). This concern is equally important for other markets, where share repurchases are well established. However, it is not feasible to generalise the US findings because they could be related e.g. to culture, managerial experience or differences in financial, labour and capital markets (Rajan and Zingales 1995; Bond et al., 1996; Short and Keasey 1999; La Porta et al., 2000 Armour et al. 2002; Dhanani 2005; Bennedsen & Nielsen 2010).

Prior literature (e.g. Bennedsen & Nielsen 2010, La Porta et al., 2000) suggests that national differences in the development of capital, financial and goods markets as well as regulatory frameworks and corporate governance systems are likely to influence corporate behaviour. La Porta et al. (2000) study the relationship between investor protection in various countries and the level of dividend payout. They find that in countries with better minority shareholder protection (e.g. countries where investors have the right to vote on the election of managers or vote on other significant firm issues, the right to take legal action against the company) firms generally pay more dividends. In line with agency theory, this indicates that minority shareholders are able to

force managers to disgorge cash and thereby protecting their investment by insiders (managers and large shareholders) expropriation. La Porta et al. (1998) find that common law countries generally have the strongest legal protections of shareholders. La Porta et al. (1997) also find that firms in common law countries have greater access to external finance such as equity and bank financing. Financial market development can also affect financing and investment decisions as it can fuel economic growth by increasing savings and directing these into productive investment (La Porta et al. 2000). The bankruptcy code has been argued to have an effect on capital structure as a strict creditor-friendly code may affect the financing decision towards equity financing (Rajan and Zingales 1995; Acharya et al 2004). Payout and investment decisions can also be influenced by differences in ownership structure (Short et al. 2002; Davis 2002; Dhanani 2005). High institutional ownership leads to increased dividend payments as these accommodate the need of institutional investors to maintain cash flows in order to serve their activities (e.g paying out pensions) (Short et al. 2002). Moreover institutional investors may discourage investment due to the risk that it can prove unprofitable (Davis 2002).

While most literature follows the approach popularised by La Porta et al (1998, 1999, 2000) which explores how differences in legal system affect firm's behaviour, there is very little research which considers the similarities or differences between countries which fall into the same general legal framework and display a similar level of economic development.

Considering the above another established market might lead to different results regarding the integration of share repurchases into financial decision-

making. The purpose of this chapter is to test the US findings against the UK market. The UK market seems the ideal market to further this study. Financial markets corporate behaviour in the USA and the UK might often be perceived to be similar since both are common law countries with market-oriented economies and they are comparatively similar in terms of market maturity and sophistication (La Porta et al. 1998; Ferris et al. 2006). Considering these similarities, one might expect the empirical relationships identified in US listed firms also to be present in their UK peers.

However, both countries display noticeable differences in terms of their bankruptcy codes, taxation, corporate governance, ownership structure and dividend policy which suggest otherwise (Rajan and Zingales 1995; Bond et al., 1996; Short and Keasey 1999; Armour et al. 2002; Dhanani 2005; DWS, 2012). Rajan and Zingales (1995) report that, the US and the UK bankruptcy codes are diametrically opposed, where the former is shareholder-friendly and the latter creditor-friendly. Moreover, UK firms historically exhibit higher dividend payouts (Bond et al. 1996; DWS 2012) than US firms. This characteristic might be associated to differences in ownership structure as mentioned earlier. Pension funds and insurance companies were holding on average 40% - 50% of UK equities for the 1994 - 2000 period (See Figure 1). Although institutional ownership in the UK decreased after 2000 high dividend payouts persisted possibly to the reluctance of managers to cut dividends (Allen and Michaely, 2003). Finally, the UK exhibits lower corporate tax than the US as during 2006-2013 corporate tax rates in the USA remained stable at 40% while in the UK tax rates gradually declined from 30% during 2006-08 to 23% in 2013, (KMPG, 2013). All else equal lower corporate taxes lead to lower tax shields and therefore provide less incentive to UK firms for debt financing.

Considering all the above the integration of share repurchases in the UK may differ from the US.

Share repurchases have been well established in the UK. In the UK share repurchases became increasingly popular throughout the 1990s and indeed exhibited an upward trend until 2005 (Eije and Megginson, 2008). Throughout the 1990s, UK firms exhibited Europe's largest share repurchase activity, (Stonham, 2002). During this period, the UK accounted for between 60% and 80% of EU share repurchases (Rau and Vermaelen 2002; Stonham 2002). Dhanani and Roberts (20009) report that in the UK share repurchases rose from £10 billion in the late 1990s to £46 billion in 2006, while the number of listed companies buying back shares rose from 14% in 1997 to 58% in 2006. Like in the USA, share repurchase activity fell in the UK during the financial crisis. Between 2008 and 2009, share repurchases by FTSE 100 companies decreased from £38 billion to £22 billion, i.e. by 43% (Dhanani and Roberts, 2010). However, subsequently share repurchases began to become more popular again, possibly due to uncertainty about the economic development and a lack of investment opportunities (Kelleher, 2012).

Due to the magnitude and frequency of share repurchases in the UK, economists have expressed similar concerns, as in the US, regarding the impact of share repurchases on investment (FINNOV 2012 a, b). This form of payout has been associated with distorted incentives such as to mitigate the EPS dilution effect of stock options and has been argued to undermine productive investment (see (FINNOV, 2012 a, b). Share repurchases decrease the number of shares outstanding while this increases when stock options are exercised. Therefore, a firm's EPS is respectively increased/decreased as

earnings are distributed across a lower/higher number of shares. Consequently firms which use stock options as a form of remuneration for employees and executives and which are concerned about EPS stability or growth can use share repurchases to moderate this dillution effect. Moreover, US and EU firms have been criticized to use share buybacks as a mean to recycle capital and propping up share prices instead of investing in CAPEX and promoting growth (Laurent, 2015). Therefore, an investigation regarding the relationship between share repurchases and investment is equally important in the UK. In addition, research in the UK has not provided clear empirical evidence whether or not UK firms substitute dividends for share repurchases.

The aforementioned relationships are of a particular interest in a UK context. UK firms have traditionally exhibited high and inflexible dividend payouts which has raised concerns about funds available for investment especially in times of recession (Griffiths and Wall, 2007). A House of Commons Trade and Industry (1994, p.70) report identified high dividend payments as a ''… weakness in the UK economy''. Dividends are considered to be ‘‘sticky’’, partly probably because dividend decreases tend to lead to share price reductions (Allen and Michaely, 2003). By contrast, share repurchases appear to be a more flexible form of payout. This might be related to the fact that reduced repurchase activities do not tend to have any negative impact on share prices (Stephens and Weisbach 1998; Allen and Michaely 2003). From this point of view share repurchases can be a practical tool which provides management with flexibility, especially helpful in periods of economic uncertainty. The aforementioned advantages might explain evidence of dividend substitution reported by a number of US studies (Grullon and Michaely 2002; Jiang, Kim, Lie and Yang 2013; Kulchania 2013). Share repurchases are also linked to a

firm's capital structure. This form of payout might be used to increase firm's gearing ratio, either in order to reduce agency problems related to the generation and use of (free) cash flow, or to pursue a cost efficient capital structure, e.g. in relation to changes to the relative cost of debt and equity capital (Jensen 1986; Dixon et al. 2008). Considering the frequency and magnitude of share repurchases in the UK, the aforementioned interrelations in UK financial decision-making concern not only domestic but also foreign investors. Since 2008, foreign investors hold almost half of UK quoted shares (OEE, 2013). Within this context, it is worthwhile to investigate how share repurchases fit within the payout, finance and investment policies of UK firms.

While previous research into financial decision-making in UK non-financial firms identified linkages between dividends and investment (Adedeji, 1998) and leverage and dividends (Ding and Murinde, 2010), these studies did not consider the impact of share repurchases, despite the fact that they were prevalent during the time these were conducted (1993-2003). As firms have limited financial resources, firms engaging in share repurchases either need to raise additional funds or to curtail their other expenditure. This suggests that decisions about share repurchases need to be made in conjunction with firms' other financial policies. This raises the question about the interrelation between decisions about investment, gearing, dividend payments and share repurchases and suggest the need for a joint investigation of share repurchases, dividends, investment and leverage within a simultaneous equation framework (see McCabe, 1979). As it was mentioned earlier this is of particular concern as decisions in favor of share repurchases have been criticized as detrimental to firms' ability to create value through investment

(FINNOV, 2012) and for leading to the excessive leverage of companies (Foroohar, 2013).

This study aims to empirically assess the aforementioned relationships using recent data (2005-2011) from non-financial UK listed companies and enrich the comparatively under-researched UK market literature on financial decision-making. The global recession originating in 2008 provides this study with a unique time framework. It will allow us to provide evidence to the relationship between investment and both dividends and share repurchases in times of recession. As discussed earlier these relationships have been highlighted as a major concern in a UK setting (Trade and Industry report 1994; FINNOV 2012). Moreover, observing possible changes in the relative importance of the determinants of corporate financial decision-making, before and after 2008 might provide us with more insight into corporate strategic behaviour and it is expected to be of interest to policy makers. Potential interdependence in UK corporate financial decision-making should further the use of simultaneous equation techniques. Secondly, the interaction between investment and share repurchases should be of concern to policymakers and shareholders given the magnitude and frequency of share repurchases in the UK (See Lazonick, 2008).

Therefore, it is of interest to explore, whether share repurchases are indeed an integral part of financial decision-making or if they are merely an ex-post adjustment of payout policies. The understanding of corporate behaviour in terms of its financial decisions especially during a crisis might be worthwhile to regulatory authorities.

Finally, this research contributes to knowledge from a methodological point of view. In addition to parametric estimations, we employ non- parametric

estimation (median regressions and regression with bootstrapped standard errors). Non-normality of financial data has been ignored in earlier research as most studies use parametric estimations. This study's approach is expected to produce more valid estimations as it accounts for non-normality in the data.

Drawing on the theoretical framework on financial decision-making discussed in detail in chapter 2, the rest of this chapter proceeds as follows: part 2.2 discusses financial decision-making in the UK; part 2.3 provides a description of the data and the chosen research methodology. Part 2.4 describes and interprets the empirical results. Part 2.5 presents the conclusion.

4.2 Financial decision-making in the UK

Payout policy and capital structure have been widely excessively researched in the US market (Allen and Michaely 2003; Frank and Goyal 2009). Related research has focused mainly on two directions. Firstly, research investigated if there is a link between financial policies and firm value. Modigliani and Miller's ''Capital structure irrelevance theorem'' (1958) and ''Dividend irrelevance theorem'' (1961) suggest that in a frictionless market financial policies do not have an impact on firm value. However, when market frictions are taken into consideration financial policies do matter (Barclay et al. 1995; Allen and Michaely 2003). The second area of research investigated the determinants of capital structure and payout policies. In this research area, the UK market has not been as extensively researched as the US. This is especially the case regarding share repurchase determinants. In addition, as explained in the previous part, differences between the US and the UK might lead to differences in financial decision-making. Therefore, this section will present an overview of UK based studies regarding financial decision-making in order to

draw conclusions regarding the empirical methodology and model.

4.2.1 Share repurchases

Share repurchases became legal in the UK under the Companies Act of 1981. However, as initially, UK firms had to cancel all repurchased shares (Dixon et al. 2008); they were unable to hold repurchased shares to facilitate future executive share or option claims. This was changed by an amendment of the UK Company Law in 2003, which permitted firms to hold repurchased shares as treasury stocks.

Share repurchases only became popular as a payout method from the mid 1990's. Between the late 1990s and 2006, the volume of share repurchases in the UK increased from £10 billion to £64 billion (Dhanani and Roberts, 2010). There are a number of ways in which a company can repurchase its shares, such as open market share repurchases, fixed price tender offers and Dutch auction offers. In open market share repurchase programs, the firm repurchases its shares through a broker on the open market in the same manner as an individual investor. In a fixed price, tender offer the firm will state the number of shares that it is willing to repurchase at a specific price by a certain date. In case that the program is oversubscribed, the firm can increase the number of shares repurchased or it can buy back its shares on a pro-rata basis. Finally, at a Dutch auction offer the firm specifies a price range in which it is willing to buy a certain number of shares. Potential investors must declare the number of shares they are willing to sell and state a selling price. The final repurchase price is the lowest price that will enable the firm to reach the number of shares specified in the offer. The final price will be paid to all investors who tendered at or below that price. In the UK tender offers are

relatively rare and open market share repurchases account for roughly 90 percent of share buyback activity (Oswald and Young 2004; Dhanani and Roberts 2009).

The aforementioned popularity of share repurchases lead to a number of UK-based studies (Hjelmstad et al.'s 2006; Dixon et al. 2008; Oswald and Young 2008; Dhanani and Roberts 2009; Young and Yang 2011). UK survey based studies and regression based studies have produced similar results to US ones regarding share repurchase determinants.

Drawing on the Agency Theory of Free Cash Flows, a number of US-based studies utilising regression analysis, suggest that share repurchases are a flexible form of payout used in order to reduce the agency costs of free cash flows (Dittmar, 2000; Fenn and Liang, 2001; Wang et al., 2009). In the UK, Oswald and Young (2008) document strong positive associations between repurchase activity and surplus cash. Moreover, Hjelmstad et al.'s (2006) UK study shows that the market reaction is more favorable to repurchase announcements by firms with low growth opportunities. This seems consistent with the free cash flow theory since firms with low growth/investment opportunities are more likely to have more excess cash. In surveys by Bancel et al. (2004) and Brav et al. (2005), 60 - 65% of US and European firms' managers viewed the ''having extra cash/liquid assets relative to my desired shareholdings'' as an ''important or very important'' motive for share repurchases. Similar results have been reported by UK-based studies. Dhanani and Roberts (2010) report that the recurrent motivation expressed by UK executives regarding share repurchases was the opportunity to return excess cash flows to shareholders. Similarly, the statement ''to return excess cash to

shareholders'' ranks second in the responses of UK manager motives for share buybacks in the survey of Dixon et al. (2008).

The option-funding hypothesis and the counter EPS dillution motive have also received support from both US and UK empirical studies. In the US, Kahle (2002) finds that that a firm is more probable to engage in share repurchases as the amount of executive options increases and that the size of actual repurchases is positively affected by the total number of options exercisable. Fenn and Liang (1999) and Weisbenner (2000) who find a positive relationship between managerial stock options and share repurchases and total stock options and share repurchases respectively report similar results. Moreover, Weisbenner (2000) highlights that the exercise of stock options decreases EPS. The author argues that managers are trying to mitigate this dilution effect by engaging in share repurchases. The reason is that, EPS is used in equity valuations and executive compensation is often EPS performance related. 75% of US managers surveyed by Bancel and Mittoo's (2005) see ''increasing EPS'' as an important or very important reason to repurchase. In addition, 67% of the sample agreed that ''offsetting the dillutionary effects of stock option plans'' (p.38) was an important or very important reason to repurchase. Similar results are reported by the UK based survey of Dhanani and Roberts (2010). Dhanani and Roberts (2010) report that increasing EPS is the second most frequently reported motive to repurchase stock, mentioned by 49% of the managers they surveyed. Young and Yang (2011) investigate the effect of EPS related compensation on share repurchases in a sample of UK firms. Their research indicates that the presence of EPS-based performance conditions in executive compensation contracts has a positive effect on share repurchases. This is also line with the aforementioned managerial responses.

Clientele Theory suggests that taxes preferences of investors affect firms' payout policies, as investor groups will invest in companies that have a payout policy which are most beneficial to them given their different which incur different tax treatment. In support of Clientele Theory, Blouin et al. (2011) find that after the 2003 tax cut in the US individuals rebalanced their portfolios to maximize their after tax returns. Blouin et al. (2011) also show that firms adjust their payout policies in order to match their shareholders preferences. The authors report that during the same period firms with a large percentage of individual shareholders increased their dividend payments. Rau and Vermaelen (2002) investigate the effect of taxes on share repurchases in the UK. During the period under investigation (1985-1998), the tax code in the UK changed considerably enabling the authors to test its effect on payout policy. The first significant change occurred on October 1996 and concerned the tax treatment of share repurchases for pension funds. Before this change pension funds were able to practice a tax-appealing form of share repurchases, the *agency buyback*. In an agency buyback an agent, (e.g an investment bank) acting for the repurchasing firm buys the firm's shares and initially contacts pension funds giving them priority over individual shareholders. The basic difference between an open market share repurchase and an agency buyback is that in the latter the seller (i.e. pension fund) is aware that it is selling to the firm. Therefore, the generated income will not be taxed as capital gains but as a distribution entitled to a tax credit. In 1996, the U.K. tax authorities identified and subsequently abolished this tax loophole. As a result, investors such as pension funds could no longer recover any tax credits. Rau and Vermaelen's (2002) (2002) findings are in line with the hypothesis that payout policy is affected by taxation. The authors report a significant increase in share

repurchases during 1994-1996, which was followed by a sharp decrease after 1996 when the change in the tax code prevented investors such as pension funds to recover tax credits related to the agency buyback. These findings also support the hypothesis of Rau and Vermaelen (2002) that share repurchase activity in the United Kingdom is driven by tax considerations of pension funds. Finally, the authors explore the impact of the elimination of tax credits for dividends in 1997 by the UK tax authorities, which made pension funds indifferent between dividends and share repurchases. Rau and Vermaelen (2002) suggested that the growth in the volume of share buy backs between 1997 and 1998 supported their contention that the change in the relative attractiveness of share repurchases to dividends affected form's payout policies. However, in a later study Oswald and Young (2004) re-examine Rau and Vermaelen's (2002) findings using alternative sources of data[22], which allowed them to capture firms' repurchase activities much more comprehensively. Based on the data Oswald and Young (2004) were unable to replicate Rau and Vermaelen's (2002) findings.

US research (Baker et al. 2003; Bancel et al. 2005) suggests that, another issue which might affect firms' share repurchase policy is the desire of managers to benefit from temporary undervaluation of their shares. Brockman and Chung (2001) in a Hong Kong based study compared the actual repurchase costs to a bootstrapping method - generated ''naïve'' accumulation plan and showed that the managers share repurchase strategy outperformed the uninformed one in every single year of their 1991-1999 period.

[22]In addition to Rau and Vermaelen's (2002) Securities Data Corporation (SDC) database, Oswald and Young (2004) use the London Stock Exchange Regulatory News Service, The Financial Times and firms' financial statements.

Rau and Vermaelen (R&V) (2002), results do not support the undervaluation hypothesis as they show that share repurchase announcements in the UK i) are not preceded by significant negative excess returns and ii) they are not followed by significant positive ones. In addition, the authors report that the average stock market reaction to repurchase announcements in the UK is less than half of the one reported in similar US studies; a result consistent with a less evident undervaluation effect. However, the research by Oswald and Young (2004) using the same sample but more comprehensive data on share repurchases contradicts Rau and Vermaelen's (2002) results. Their findings not only suggest that share repurchases in the UK are not significantly lower than in the USA, they also indicate that share repurchase announcements and actual share repurchases in the UK are also preceded by significantly negative 12-month excess returns, and that share repurchase announcements are followed by significantly positive 12-month excess returns. Oswald and Young (2004) conclude that, like in the USA, taking advantage of undervaluation is still a key factor in UK firms' repurchase decisions. Their findings are supported by the survey-based study of UK managers by Dixon et al. (2008). In this study executives rank the undervaluation motive as the second most important motive for share repurchases

Rau and Vermaelen (2002) attribute their findings to the stricter regulatory environment in the UK. In support of their contention, Rau and Vermaelen (2002) highlight that although share repurchases are much more widely employed in the UK than in the rest of the EU compared to the USA the practice is still much less widely used. Rau and Vermaelen (2002) report that the London Stock Exchange Model Code has timing restrictions in place in order to prevent insider trading during open market share repurchases; that is

to prohibit firms to repurchases their share only when they are undervalued. The Model Code prohibits firms to repurchase shares during ''close periods'' which are non-trading windows when officers and directors are not allowed to trade in their firm's shares. These non-trading windows include the two months before the publication of annual or semi-annual earnings and one month before the publication of quarterly results. Moreover, the LSE requires repurchasing firms to report the repurchase by 8:30 on the day following the transaction. This is supposed to make shareholders and potential investors aware of the firm's actions in the market and their potential influence and allow them therefore to take more informed investment decisions. Rau and Vermaelen (2002) argue that these regulations make it more difficult for UK companies to use open market repurchases to exploit perceived undervaluation than their US counterparts.

Therefore, while prior literature suggests that share repurchases in the UK are affected by the same factors as in the US, there appear to be differences in their importance.

The use of share repurchases is also linked to major financial decisions as capital structure, dividends and investment. Share repurchases might be used to increase firm's gearing ratio, either in order to reduce agency problems related to the generation and use of (free) cash flow, or to pursue a cost efficient capital structure. Share repurchase reduce the value of shares outstanding and can cause rapid capital structure changes if funded by debt (Dhanani 2010). Stothard (2013) supports that firms given the correct market timing are replacing expensive equity in their capital structure for cheap tax-deductible debt. Surveys of executives in the USA and the UK suggest that gearing is not one of the main objectives of share buy-backs. E.g. Baker et

al.'s (2003) suggested that only 10% of US managers think that ''changing the capital structure of the firms'' is a highly important reason for a share buyback, while 54% state that it does not have any effect on their repurchase decision (Baker et al. 2003). In the UK, Dhanani and Roberts (2010) report that 36% of the managers of the repurchasing firms' sample agreed that ''increasing the firm's gearing'' is a repurchase motive. It seems that the gearing hypothesis is dominated by the Free Cash theory, the EPS dillution motive and the undervaluation-investment hypothesis as it is ranked 4th behind the incentives ''To return excess cash to investors'', ''To improve the firms reported EPS'' and ''To signal undervaluation of the company's shares to investors''. By contrast, Dixon et al.'s (2008) survey of UK firms finds that managers rank the use of share repurchases as a means to increase the firm's gearing as the most important reason. The difference in the survey results might be explained by the fact that Dixon et al.'s (2008) survey was conducted prior to 2003, when UK companies were required to cancel all repurchased shares. Therefore, unlike US firms, UK ones were not to able buy shares at a low price and reissue them to executives in the future after the share price has appreciated. By contrast, Dhanani and Roberts' (2009) survey was conducted after the change in UK Company Law in 2003, when companies were able to hold repurchased shares as treasury stock.

Share repurchases can also substitute dividends since Jensen (1986) argues that in markets with limited control via competitive markets, managers are likely to prefer reducing free cash flow via share repurchases, over dividends and over leverage. As explained by the Clientele theory earlier share repurchases might be a more tax efficient form of payout compared to dividends. Nevertheless, dividend policy is considered to be inflexible in both

the US and the UK (Allen and Michaely 2003; Griffiths and Wall 2007). However, UK firms tend to have higher dividend payouts (Bond et al. 1996; DWS 2012) than US firms. In this context, and given the inherent flexibility of share repurchases, it is of interest to investigate their relationship between share repurchases and dividends and the degree of possible dividend substitution already indicated by US based empirical studies (see Grullon and Michaely 2002; Jiang et al. 2013). Grullon and Michaely (2002) report that figures show a decline in the dividend payout ratio of US firms the total payout ratio seems constant indicate dividend substitution (after the 1980's). Moreover, the authors support that the market shows signs that it perceives repurchases as dividend substitutes since the market's reaction of dividend cuts from firms that repurchase is not significantly different from zero. Jiang et al.*'s* (2013) argue that managers consider dividends and share repurchases to be substitute payout mechanisms as well. Their findings show that the dividend premium has a negative effect on the repurchase choice; whereas the repurchase premium has a negative effect on the dividend choice. This is consistent with the substitution hypothesis. Extant theories suggest interactions not only between share repurchases, dividends, and capital structure but also with share repurchases and investment. The Budget Constraint Theory of McCabe (1979) predicts that share repurchases a use of funds should negatively interact with other uses of funds (as in dividends and investment) and positively to sources of funds (leverage). Moreover, the Pecking Order Theory predicts that firms, which engage in share repurchases, will in the long-run decrease dividends and/or increase their leverage in order to fund investment while avoiding the costs of equity financing.

As discussed above, share repurchases are expected to be influenced by other key financial decisions, in particular dividends, investment and capital structure.

However, so far research in the UK has investigated share repurchases in isolation (Oswald and Young 2008; Young and Yang (2011).

4.2.2 Dividends

UK firms tend to have higher dividend payouts than their counterparts in other developed markets, such as the USA and Europe (Cook 2014; Jones 2014). Moreover, in the UK (like in other countries) dividend payments tend to be fairly inflexible (sticky) – (Griffiths and Wall, 2007), with heavy penalties for negative dividends surprises (Braggion and Moore, 2011).

The literature has investigated the relationship between dividend payouts and firms specific factors (i.e. profitability, free cash flows) drawn from extant theories. Profitability is expected to have a positive effect on dividend payouts according to the Pecking Order Theory. Firms that are more profitable generate more internal funds and thus can afford to maintain a higher level of dividend payout without the risk of resorting to external financing. US based studies by Jensen et al. (1992) and Aggarwal and Kyaw (2010) indeed report a positive relationship between dividends and profitability. The same effect is reported by Adedeji (1998) for a panel of UK firms.

Free Cash Flow Theory predicts a positive relationship between dividends and size, assuming that larger firms generate more free cash flows. In this case dividends are used to reduce free cash flows and the corresponding agency costs. Firm size is reported to have a positive effect on dividend payout by

Aggarwal and Kyaw (2010) and Adedeji (1998) for the US and the UK respectively. However, Bancel et al.'s (2004) and Brav et al.'s (2005) survey European and US managers respectively regarding payout policy provide weak to moderate support to the Free Cash Flow Theory. In the US 30.3% of firms' managers view the ''having extra cash/liquid assets relative to my desired cash holdings'' as an ''important or very important'' dividend incentive. In addition, only 13.3% view ''Paying out to reduce cash, thereby disciplining my firm to make efficient decisions'' as an ''important or very important'' incentive. The respective figures from the survey of European managers by Bancel et al. (2004) are 28.09% and 21.74%. Similar results have been reported by UK-based studies. The survey of UK managers regarding dividend policy by Dhanani (2005) does not support the notion that dividend policy is used to mitigate agency problems. Only 15.5% of managers agree that dividends can be used as a ''bonding mechanism, encouraging managers to act in the interests of outside shareholders'' (pp. 1658).

The UK dividend literature has also focused on investigating how possible country-specific characteristics (i.e. tax code, ownership structure) affect dividend policy. As far as the tax code is concerned, the UK operated under a partial imputation system between 1973 and 1999. This system provides some tax relief to shareholders in recognition of corporation tax paid by the firm. As Lasfer (1966) explains, assuming that a firm pays a net cash dividend d, it must also pay an advanced corporation tax (ACT) equal to the basic rate of income tax on the gross dividend D. If τ is the standard rate of income tax, the gross dividend D, is defined as $d/(1-\tau)$ and ACT is τD, i.e., $\tau d/(1-\tau)$. The ACT is first paid to the Inland Revenue fourteen days after the end of the quarter in which the dividend is paid and then deducted from the firm's

corporation tax liability, usually payable nine months after the end of the accounting period. Shareholders pay tax pD, where p is their personal rate of income tax and receive a tax credit of τD. Thus, shareholders' dividend tax is $(p-\tau)D$, i.e., $d(p-\tau)/(1-\tau)$. As Short et al (2002) report, tax-exempt shareholders such as pension funds received a cash refund of the tax credit from the tax authorities. They therefore prefer dividends to profit retentions. Given the tax system while basic rate taxpayers are neutral between dividends and retentions, higher rate taxpayers prefer retentions over dividends. However, as Rau and Vermaelen (2002) report, in 1997 pension funds lost their ability to reclaim tax credits for dividends as UK authorities abolished ACT.

However even without a tax incentive pensions funds and insurance companies are likely to prefer the stable inflow of dividends payments (over share repurchases or retentions) due to prudent-man rule restrictions[23] (see Brav and Heaton, 1998). Such restrictions aim to protect investors from risky investments. Dividends accommodate their need to maintain cash flows in order to serve their activities (e.g paying out pensions). Institutional investors such as pension funds have traditionally owned a significant percentage of UK equities. For example, pension funds and insurance companies were holding on average 40% - 50% of UK equities for the 1994 - 2000 period (See Figure 4). This phenomenon might explain the higher dividend yields reported in the UK when compared to other developed markets. However after 2002 domestic

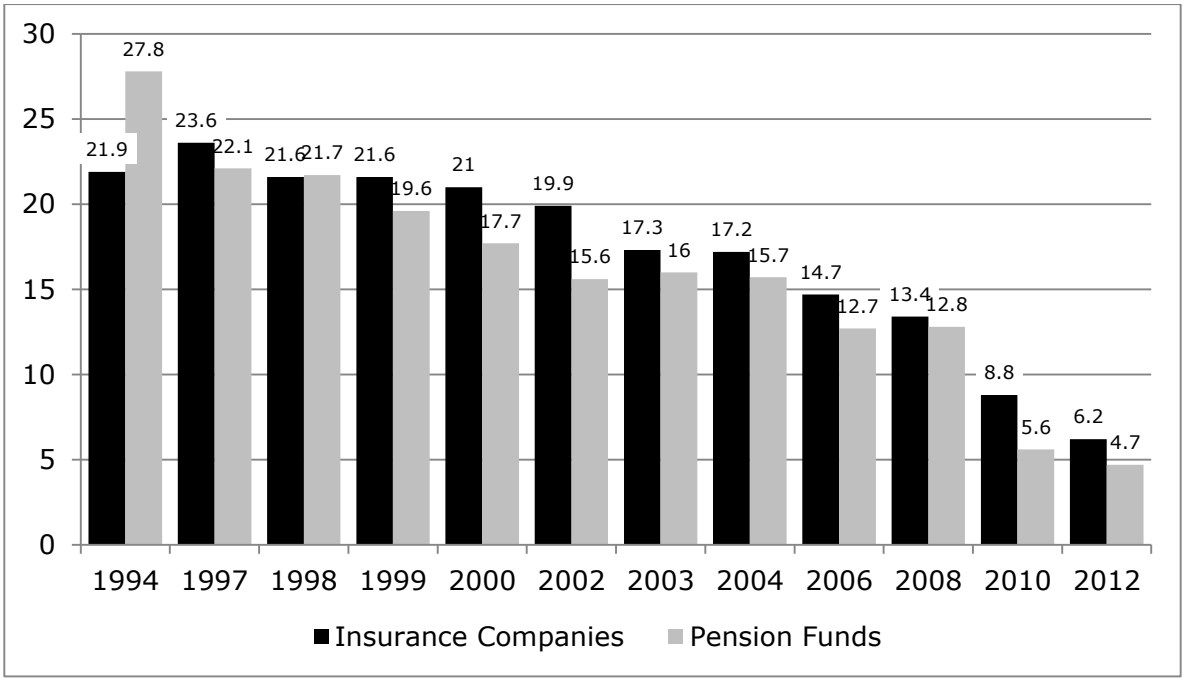
[23]Brav and Heaton (1998) report that the Employee Retirement Income Security Act of 1974 (ERISA) subjected private pension funds to a more strict "prudent man" rule. In addition, the US case law approved prudent investments as investments that paid steady dividends. Therefore the investment of pension funds seems to be guided to the direction of medium or high dividend paying firms.

pension funds have been moving out of the domestic equity market (see Figure 1) possibly due to its underperformance compared to the bond market (FT, 2012 a,b). The decrease in institutional ownership is more profound during the financial crisis possibly due to the additional safety provided by fixed income investments.

The fact that dividend yields remain high even after the decrease in institutional ownership might be attributed to the reluctance of managers to reduce dividends (see Allen and Michaely, 2003). Allen and Michaely (2003) survey the literature on payout policy and report that empirical research agrees that markets dislike dividend reductions and that these are followed by share price reductions. Therefore, managers generally avoid cutting dividends.

Empirical research in the UK has produced conflicting results regarding the effect of taxes and ownership structure on payout policies. Lasfer's (1996) findings show that in the UK taxes affect payout policy, as a lower tax burden on dividends is associated with higher dividend payouts. A recent study by Jacob and Jacob (2012) on a number of countries, including the UK, finds that taxes are first-order determinants of payout policy, but that effects are smaller than reported in recent single-country, single-event analyses. Similarly, US and European financial executives' responses in the surveys by Bancel et al. (2005) and Brav et al. (2003) give weak to moderate support to the impact of taxation on dividend policy. The percentage of financial executives that rate ''the personal taxes of my shareholders when receiving dividends'' as ''important or very important'' factor affecting dividend policy is around 21% in both the US and Europe.

Figure 4 Insurance companies and pension funds percentage ownership of UK listed companies



Source: ONS (2013) *Share Ownership 2012*, Office for National Statistics: Cardiff.

Brav et al. (2007) explain that managers identified other factors to be more significant payout determinants and suggest that firms who initiated or increased dividends were "on the fence" to do so before the tax cut. In general, research so far seems to indicate that tax and clientele considerations affect dividend policy but are of second order importance when compared to other payout policy determinants.

Empirical research in the UK seems to indicate that the same firm specific and country specific considerations drive dividend policy in the UK, as in other countries. Moreover, extant theories identify linkages between dividends, share repurchases, investment and dividends. Pecking Order Theory suggests that firms might cut dividends in order to avoid asymmetric information costs of external financing, (Myers, 1984). However, since dividends are "sticky"

firms will resort to debt financing in order to fund investment opportunities. Therefore, according to this theory we expect a strong positive impact of investment on leverage.

Moreover, Free Cash Flow Theory suggests that, since dividend payouts are high, UK firms will use less debt and share repurchases to mitigate the related agency costs. Finally, the Budget Constraint hypothesis of McCabe (1979) suggests that dividends are negatively influenced by uses of funds (share repurchases and investment) and positively by sources of funds (leverage).

Adedeji (1998) tests the Pecking Order Theory in a sample of UK firms and identifies interactions between dividends and investment. In addition, Aggarwal and Kyaw's (2010) findings show interactions between dividends and capital structure. Finally, empirical research in the US market regarding share repurchases indicates dividend substitution, (Grullon and Michaely 2002; Jiang et al. 2013). However, dividend related research in the UK so far has largely ignored this interdependence.

4.2.3 Capital structure

One of the most basic financial decisions of a firm's management is to decide its financing mix (Barclay et al. 1995). In Modigliani and Miler's (1958) perfect and frictionless capital markets, this decision is irrelevant and does not affect firm value. However, theories, which take into account market frictions, have identified factors that matter and therefore must be taken into consideration when financing mix is decided. Moreover, these theories, namely the Pecking Order Theory (Donaldson 1961; Myers 1984), Free Cash Flows theory (Jensen 1986), Trade Off theory (Myers 1984) and the Budget Constraint theory

(McCabe 1979) suggest interactions between capital structure and other basic financial decisions such as payout and investment.

Prior research into capital structure in UK listed companies suggests that, that similar to the US, Pecking Order Theory, Free Cash Flows Theory and the Trade Off Theory all contribute to explain a significant part of capital structure decision-making. The study of Rajan and Zingales (1995) looks at capital structure determinants for the G-7 countries. The authors conclude that a firm's profitabilty, tangibility, size and growth opportunities correlate to firm leverage in a similar way in each of these countries. Specifically, their results suggest that in the UK capital structure is positively influenced by firm's asset tangibility and size while negatively influenced by a firm's growth opportunities and profitability. The same results regarding UK listed firms are reported by De Jong et al. (2007). The positive relationship between leverage and tangibility supports the Agency Theory. Jensen (1979) argues that firms with tangible assets can use them as collateral when a firm is taking on debt, thus reducing debt's agency costs. Also, in favor of Agency Theory is the negative effect of growth opportunities on leverage. Agency Theory suggests that firms with good growth opportunities tend to rely more on equity financing due to the potential agency costs of debt.

The positive relationship between leverage and size supports the Trade-Off Theory. Larger firms are expected to have a lower default probability and therefore can use more debt in their capital structure.

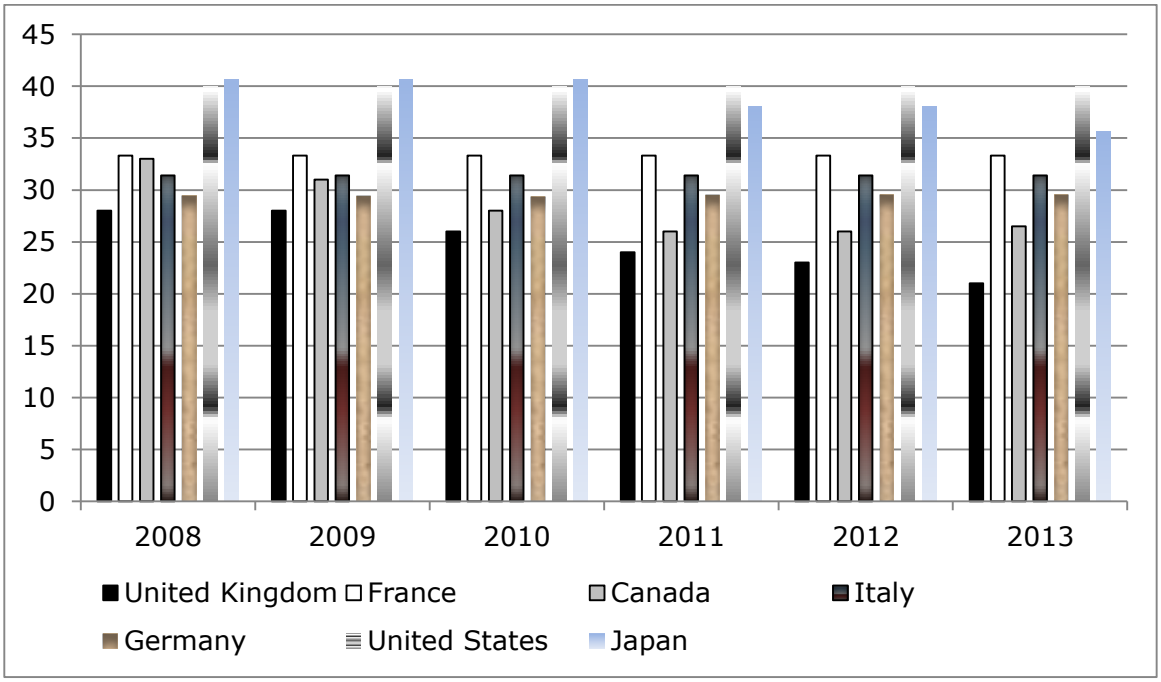
Finally, the Pecking Order Theory suggests that more profitable firms prefer internal financing to reduce costs associated with information asymmetry. This is in accordance to Rajan and Zingale's (1995) the reported negative impact of

firm profitability on leverage.

In addition to firm specific determinants there is also a strand of capital structure literature, which examines how institutional differences among countries affect corporate financing decisions. For example, bankruptcy codes differ around the world in terms of their creditor-friendliness and can have an effect on capital structure decisions. The UK bankruptcy code is characterized as creditor- friendly (Franks and Taurus 1993; Rajan and Zingales 1995). Rajan and Zingales (1995) argue that under such a bankruptcy code factors, which affect a firm's bankruptcy risk, are likely to impact particularly negatively on gearing. In addition, Rajan and Zingales (1995), De Jong et al. (2007) and Antoniou et al. (2008) report that UK listed firms appear to have relatively lower gearing ratios when compared to their G-7 counterparts and argue that this might be related due to the stricter UK bankruptcy code. UK managers might want to avoid carrying too much debt in their capital structures in order to reduce their bankruptcy risk.

Another factor, which influences capital structure, is taxation. Modigliani and Miller (1963) argue that debt financing has the advantage of interest expenses being tax deductible. Survey research in European and US firms reports that roughly 50% of firm managers describe the ''tax advantage of interest deductibility'' as an ''important or very important'' factor affecting capital structure (see Graham and Harvey 2002 a,b; Bancel and Mittoo 2004; Brounen et al. 2005). In the UK tax rates gradually declined from 28% in 2008 to 21% in 2013 (Figure 5). According to the Trade-Off Theory and all else equal, this differential in corporate tax gives UK firms weaker incentives to increase their leverage in order to shield their income from the tax rate.

Figure 5 Corporate Tax Rates



Source: KPMG (2013) *Corporate Tax Rates Table*, KPMG International.

International studies have shown firm leverage of UK firms is similarly correlated capital structure determinants identified in other countries. Specifically, in the UK capital structure has been found to be positively influenced by a firm's tangibility and size while negatively influenced by a firm's growth opportunities and profitability. However, UK listed firms also appear to have relatively lower gearing ratios when compared to other developed economies, possibly due to regulatory and tax differences.

Existing theories support that capital structure interacts with basic financial decisions as dividends, share repurchases and investment. From an Agency Theory perspective UK firms' higher dividend ratios might lead to lower gearing as the related agency costs are reduced by high dividend payments. Moreover, the budget constraint Theory of McCabe (1979) would support that high dividend ratios mean more uses of funds and therefore a greater need for

sources of funds (leverage) and or greater interdependence between uses of funds (investment, dividends and share repurchases). However, similar to the US, the majority of UK empirical research has investigated capital structure in isolation (see Rajan and Zingales 1995; Frank and Goyal 2009) from other financial decisions potentially leading to misspecification and endogeneity problems.

4.2.4 Investment

In perfect capital markets, investment should be independent of the firm's choice of financing (Modigliani and Miller, 1958). On the contrary, the Pecking Order Theory (Donaldson 1961; Myers 1984), Free Cash Flows theory (Jensen 1986), Trade Off theory (Myers, 1984)and the Budget Constraint theory (McCabe, 1979) suggest that investment affects and is affected by capital structure, dividends and share repurchases. Moreover, these theories indicate factors that affect firm investment.

The Budget Constraint theory and the Pecking Order theory support that pprofitable firms are expected to be less financially constrained as they generate more funds to finance investment opportunities internally (McCabe 1979; Demarzo, Fishman, He and Wang 2012). Regarding the relationship between firm size and investment research which focuses exclusively on very large firms tends not to find a statistically significant relationship. However research which covers smaller firms or the whole range of size classes tends to find evidence that firm size is relevant to investment (Baskin 1989; Rahaman 2011; Prombutr et al. 2012). Finally the previous literature suggests that depreciation is expected to be positively related to investment. McCabe (1979) supports that depreciation identifies cash flows which can be used to fund investment. In addition, Abel and Eberly (2012) argue that, as the

depreciation rate reflects the users' cost of capital, investment is a linear function of the depreciation rate.

Moreover, a number of theories suggest interactions between investment and payouts and capital structure. McCabe's (1979) Budget Constraint theory supports that in imperfect capital markets firms the financing choice should be accounted for when investment is set. The Budget Constraint Hypothesis of McCabe (1979) and the Pecking Order Hypothesis also suggest interactions between investment and other financial decisions. This has been acknowledged in the UK, where firms' high and inflexible dividend payments have raised concerns regarding funds available for investment in times of recession (House of Commons Trade and Industry report 1994; Griffiths and Wall, 2007). McCabe's Budget Constraint Theory suggests that ceteris paribus UK firms will need more debt financing to fund share repurchases and investment since they do not usually obtain funds by dividend reductions. However, UK firms appear to rely less on debt financing (see Rajan and Zingales 1995; De Jong et al. 2007; and Antoniou et al. 2008). Therefore, a strong interaction between investment and share repurchases is expected in the UK.

The same would be expected by the Pecking Order Theory. Since dividends are considered inflexible UK firms are expected to cut share repurchases in order to avoid the asymmetric information costs of obtaining external financing.

As in the case with capital structure, dividends and share repurchases, investment has been studies mostly in isolation thereby ignoring the aforementioned interdependence (Baskin 1989; Rahaman 2011; Prombutr, Phengpis and Zhang 2012; Abel and Eberly 2012).

4.2.5 Summary

This part has reviewed four basic financial decisions namely share repurchases, dividends, capital structure and investment in a UK setting. There are noticeable differences between the US and the UK in terms of their bankruptcy codes, taxation, corporate governance, ownership structure and dividend policy (Rajan and Zingales 1995; Bond et al., 1996; Short and Keasey 1999; Armour et al. 2002; Dhanani 2005; DWS, 2012). As prior literature (e.g. Bennedsen & Nielsen 2010, La Porta et al., 2000) suggests such differences are likely to influence corporate behaviour. This review has shown that in the UK share repurchases, dividends, capital structure and investment seem to be driven by the same firm specific factors but with differences regarding their importance. Moreover, extant theories identify linkages between dividends, share repurchases, investment and dividends. Financial decision-making related research in the UK so far has largely ignored this interdependence.UK based empirical studies, which do provide evidence of interdependence between dividends and investment (Adedeji 1998) and dividends and capital structure (Ding and Murinde 2010). However, these studies do not take into account the phenomenon of share repurchases leading to misspecification concerns. Therefore, a joint investigation into UK financial decision-making, which accounts for share repurchases is worthwhile as it will deal with endogeneity and misspecification concerns. Finally, this study aims to investigate this interdependence before and after the credit crunch. Due to the liquidity originating in September 2008 firms might have readjusted their corporate policies. The understanding of corporate behaviour in terms of its financial decisions especially during a crisis might be worthwhile to regulatory authorities.

4.3 Data and methodology

In the previous section, we reviewed the determinants of each of the financial decisions under investigation from a UK perspective. We have seen that share repurchases, dividends, leverage and investment in UK firms are affected by the same factors identified in the US. Moreover, the theoretical framework for a joint investigation of these four financial decisions holds equally for the UK market. Therefore we follow a similar methodological approach to the one followed for the US chapter study.

4.3.1 The empirical model

Taking into consideration this study's objectives, we formulate the following system of equations, consisting of one equation for each financial decision under investigation. For every company i, each financial decision is a function of the remaining ones, plus a vector of exogenous control variables related to the specific financial decision. Thus, we arrive at the following system of equations,

$$LEV_i = f_1(DIV_i, REP_i, INV_i, Controls_{1i}) + \varepsilon_{1i} \quad (1)$$

$$DIV_i = f_2(LEV_i, REP_i, INV_i, Controls_{2i}) + \varepsilon_{2i} \quad (2)$$

$$REP_i = f_3(LEV_i, DIV_i, INV_i, Controls_{3i}) + \varepsilon_{3i} \quad (3)$$

$$INV_i = f_4(LEV_i, DIV_i, REP_i, Controls_{4i}) + \varepsilon_{4i} \quad (4)$$

where ε_{1i} , ε_{2i}, ε_{3i}, ε_{4i} are stochastic zero mean error terms.

The dependent variables LEV, DIV, REP and INV represent Leverage, Dividends, Share Repurchases and Investment respectively. $Controls_{1i}$, $Controls_{2i}$, $Controls_{3i}$ and $Controls_{4i}$ are the respective vectors of exogenous control variables for each dependent variable. The control variables included in each vector have been identified based on relevant theories and prior empirical research as discussed in chapter 2. Therefore $Controls_{1i}$, $Controls_{2i}$,

$Controls_{3i}$ and $Controls_{4i}$ include the same variables as described in Table 16.

Substituting each of the vectors ($Controls_1$, $Controls_2$, $Controls_3$ and $Controls_4$) with the abovementioned variables we arrive at the following system of equations[24]:

(1) $LEV_i = \alpha 0 + \alpha 1 DIV_i + \alpha 2 REP_i + \alpha 3 INV_i + \alpha 4 ROA_i + \alpha 5 SIZE_i + \alpha 6 GROWTH_i + \alpha 7 FCF_i + \alpha 8 COLTRL_i + \alpha 9 ZSCORE_i + \varepsilon_1$

(2) $DIV_i = \beta 0 + \beta 1 LEV_i + \beta 2 REP_i + \beta 3 INV_i + \beta 4 ROA_i + \beta 5 SIZE_i + \beta 6 GROWTH_i + \beta 7 FCF_i + \beta 8 BETA_i + \varepsilon_2$

(3) $REP_i = \gamma 0 + \gamma 1 LEV + \gamma 2 DIV_i + \gamma 3 INV_i + \gamma 4 SIZE_i + \gamma 5 GROWTH_i + \gamma 6 FCF_i + \gamma 7 OPTIONS_i + \gamma 8 RETURN_i + \gamma 9 SLIQ_i + \gamma 10 CASH_i + \varepsilon_3$

(4) $INV = \delta 0 + \delta 1 LEV_i + \delta 2 DIV_i + \delta 3 REP_i + \delta 4 ROA_i + \delta 5 SIZE_i + \delta 6 GROWTH_i + \delta 7 DEPRC_i + \varepsilon_4$

4.3.2 Sample and Data

In order to investigate if share repurchases are related to managers' other principal financial decisions in UK firms we use the FTSE All-Share Index as the initial sample. We obtain data from the Thomson Reuters Datastream database. We exclude from the sample financial and utilities firms as they are heavily regulated and have special capital structures (see Rajan and Zingales 1995), leaving us with 339 firms. After removing firms with missing observations the final sample consists of 214 firms. In order to use recent data for our analysis we collect data from the period 2005-2011. While taking into the UK recession originating in Q.2 2008 (see Figure 6) we split this period into two subsamples 2005-2008 and 2008-2011. Keeping this in mind and assuming the long-term nature of financial decisions we expect that during 2008 many firms readjusted their financial policies in light of the liquidity crisis

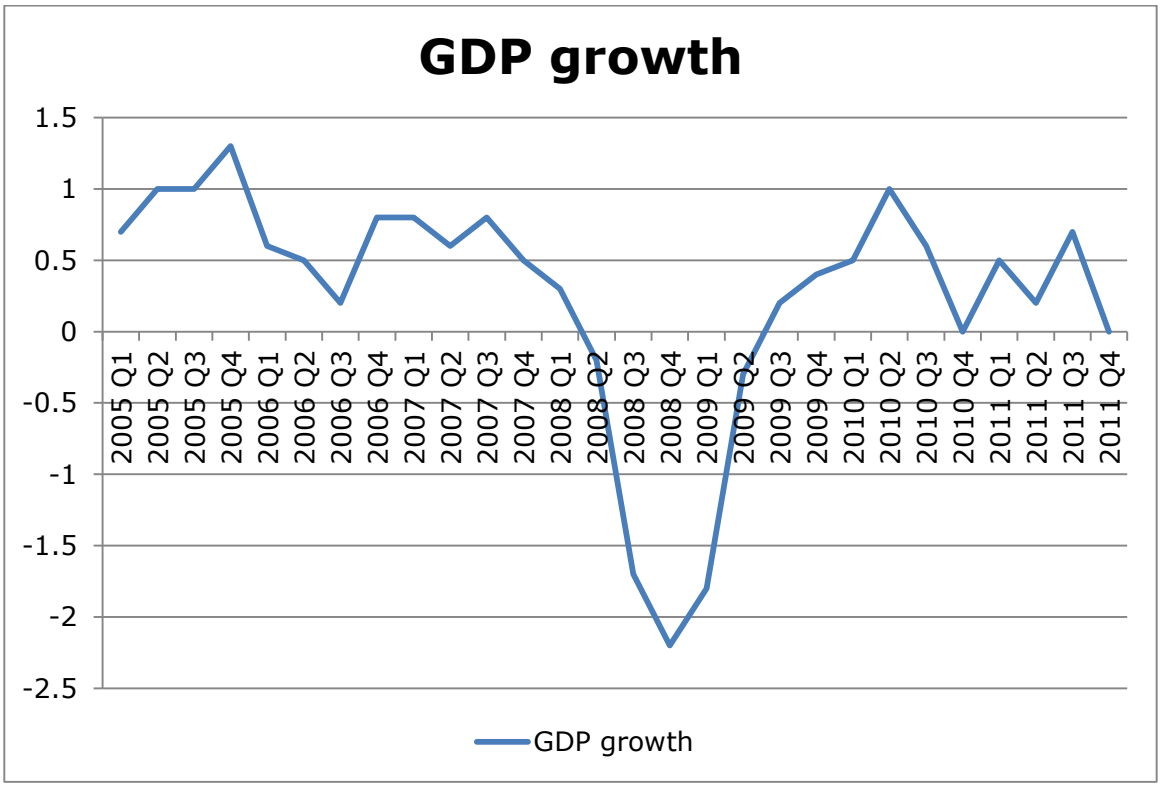
[24] As part of sensitivity testing we controlled for industry effects by re-estimating my system of equations including industry dummies in every equation. We did not observe any change in the direction of the relationships under investigation, however there were changes in statistical significance. Since in many cases the industry dummies were insignificant their inclusion most probably increased the coefficients' variance and thus affected their statistical significance.

triggered by the collapse of Lehman Brothers in September 2008 and the 2008-2009 recession. We therefore included 2008 in both periods.

Moreover, since decisions about investments, capital structure and pay-put policies are deemed long-term decisions (Adedeji 1998, McCabe 1979) we follow previous literature (Adedeji 1998; Huang and Song 2006) and use 4 year-averages for all variables. Finally, following the UK based literature regarding capital structure and payout research we use the proxies[25] mentioned in Table 5. For constructing our UK dividend and share repurcahses payout ratios we choose to scale by total assets instead of net income. In the UK, companies are considered to have particularly sticky dividends, i.e. dividend payments are maintained irregardeless of fluctuations in profitability (see Griffiths and Wall 2007; Braggion and Moore 2001; Cook 2014; Jones 2014). Therefore, we scale payouts by total assets which is used as the denominator for all other scaled variables. Table 17 provides descriptive statistics for the data. Table 18 compares the averages of the variables between the two sub-periods 2005-08 and 2008-2011. Results show that key financial decisions investment, dividends, share repurchases and investment are statistically significant different from each other according to the t-test. It appears that these variables have been affected by the crisis thus justifying our decision of splitting the period into consideration into two sub-periods. More specifically, it appears that on average dividends, share repurchases, investment and leverage have decreased for the 2008-11 period.

[25] For a detailed discussion regarding proxy selection see the related US chapter part 3.3.4

Figure 6 QDP quarter on quarter growth



Source: ONS (2014) *Key Economic time series data: GDP*, Office for National Statistics, available online at: www.ons.gov.uk

We hypothesize that firms make long-run decisions regarding their capital structure, payout and investment policies, which are consistent with each other. My theoretical framework suggests interdependence between the above-mentioned financial decisions and implies that the corresponding variables (LEV, DIV, REP, INV) are endogenous. In addition, Adedeji (1998) and Ding and Murinde (2010) provide empirical evidence of interdependence between dividends and investment and dividends and capital structure in UK firms. In order to deal with endogeneity issues besides the traditional OLS we use two-stage Least Squares (2SLS) and three-stage Least Squares (3SLS) (see Gujarati 2004). The first stage of the 2SLS procedure regresses each endogenous variable (LEV_i, DIV_i, REP_i, INV_i) on every exogenous variable in the system (i.e. the control variables included in $Controls_{1i}$, $Controls_{2i}$, $Controls_{3i}$

and $Controls_{4i}$) to obtain the fitted values. The obtained fitted values are "purged" of the influence of the respective disturbance terms. For the second stage of the 2SLS process, the obtained fitted values are used as instruments, replacing the right hand side endogenous variables in equations (1)-(4). The 2SLS process produces consistent estimates. However, 2SLS is a limited information method as it estimates each equation in the system individually without worrying about the restrictions on the other equations in the system and hence may be inefficient.

By contrast, the 3SLS process is a full information method, which estimates all the equations in the model simultaneously, thus taking into account any restrictions resulting from the omission or inclusion of a variable in each equation. However, as Gujarati (2004) notes, 3SLS is sensitive to specification errors. Since 3SLS is a full information method, if one equation is misspecified, the error is transferred to the rest of the system's equations.

The selection of control variables in each equation in the system satisfies the rank and order conditions of identification. In each equation, there are some control variables, which are included only to this equation and therefore can be used as instruments. In order for instruments to be valid they need to satisfy two conditions i) Instrument relevance and ii) instrument exogeneity (Gujarati 2004; Stock and Watson 2011). Assuming an endogenous regressor X_i and its' instrumental variable Z_i, instrument relevance means that the variation of the instrumental variable is related to the variation of the endogenous regressor or $Corr(Z_i,X_i)\neq 0$. Instrument exogeneity means that the instrumental variable Z_i is uncorrelated to the error term u_i of the regression where the endogenous regressor is included or $Corr(Z_i,u_i)=0$. If these conditions are not met, 2SLS and 3SLS can produce poorer results than OLS as the relevant estimators can

have large standard errors and large asymptotic bias (Woolridge, 2006). Furthermore, Gujarati (2004) states that in practice it is not easy to find instruments, which satisfy these conditions.

Regarding the instrument choice, we follow previous literature. For dividends (DIV) we use firm systematic risk (BETA) as the instrumental variable (see McCabe 1979; Aggarwal and Kyaw 2010). Bankruptcy risk (ZSCORE) and collateral (COLTRL) serve as instruments for leverage (LEV) (see Noronha et al 1996; Aivazian et al 2005; Aggarwal and Kyaw 2010). Share repurchases have not been used as an endogenous variable in research so far. The choice of instrumental variables for share repurchases is based on two conditions. First, theoretical and empirical research has found these variables to be correlated to share repurchases. Secondly, these variables have not been found by empirical research to be important determinants of dividends, investment and leverage. Therefore, for share repurchases (REP) I use stock options (OPTIONS), share price returns (RETURN), stock liquidity (SLIQ) and cash holdings (CASH) as instruments. Following a similar rationale, depreciation (DEPRC) is the instrumental variable for investment (INV).

In advance of the regression analyses we examine the distribution of the data since it is a basic assumption of OLS, 2SLS and 3SS methodology. Table 19 presents the results of the three normality tests. The first two tests test the null hypothesis that the data have the skewness and kurtosis of a normal distribution. The third combines the two in an overall test statistic similar to the Jarque-Bera test for normality. According to these tests the data do not follow the normal distribution. In order to deal with this we use three measures.

First, I winsorize[26] the data at the conventional 5% level to deal with potential outliers. Secondly, we use two alternative non-parametric estimation techniques, median regression and regression with bootstrapped standard errors. The median-regression model can be used to achieve the same goal as conditional-mean-regression modelling to represent the relationship between the central location of the response and a set of covariates (Hao and Naiman 2007). In addition, Hao and Naiman (2007) argue that in cases when the distribution is substantially skewed, the mean is not appropriate for interpretation while the median remains highly informative. Therefore, conditional-median modelling has the ability to be more practical.

As a further alternative, we use regression analysis with bootstrapped standard errors. This approach is suggested, as it does not require distributional assumptions such as the residuals to be normally distributed and in addition, it can provide more accurate inferences (Guan 2003; Fox 2008). This method is based upon resampling the regression's residuals in order to approximate their underlying distribution rather than assuming it (e.g normal distribution). Non-parametric estimations deal with the non-normality of our data; however, they do not deal with the endogeneity expected to be present in our system of equations.

Regarding the OLS, 2SLS and 3SLS estimations, we also test for the presence of multicollinearity between the covariates. Tables 30-33 present the VIF factors for each variable in each regression in the model for both periods (2005-08, 2008-11). Results indicate no multicollinearity problems. The

[26] Regression results from the winsorized data have produced more statistically significant variables and higher R-squares compared results from to the non-winsorized data confirming the distortion from outliers.

relevant rule of thumb suggests that if a variable has a VIF factor greater than 10 the variable may merit further investigation, Gujarati (2004). These variables have a max of 6.18 thus suggesting that multicollinearity is not an issue

In order to establish the validity of the 2SLS and 3SLS we employ two tests regarding instrument validity. We use the Cragg-Donald Wald test for weak identification. Weak identification arises when the excluded instruments are weakly correlated with the endogenous regressors. Consequently, estimators can perform poorly. Low values of the Cragg-Donald Wald F-statistic (i.e lower than 10) indicate weak instruments (Stock and Yogo, 2005). In addition, we use the Sargan test for overidentifying restrictions. The null hypothesis is that all instruments are valid i.e., uncorrelated with the error term. If the computed chi-square exceeds the critical chi-square value, we reject the null hypothesis, which means that at least one instrument is correlated with the error term and therefore the estimates based on the chosen instruments are not valid. Table 5f presents the instrumental variable tests' results for each 2SLS regression.

The weak identification test, as it can be seen from Table 27, indicates that we have a weak instrument problem, in every regression, in both periods. The Cragg-Donald Wald F-statistic is quite low ranging from 1.13 in the investment regression in 2005-08 to 5.22 in the dividend regression in 2005-08. Stock and Yogo (2005) report that, as a rule of thumb Cragg-Donald Wald F-statistics below 10 indicate weak instruments. In addition, Sargan test's results indicate that the instruments are correlated with the error term in most of the regressions. The exception being the share repurchases and leverage equations in 2005-08 and the share repurchases equation in 2008-11.

Instrumental variables tests cast doubt on the instrument validity. The problem of weak instruments is often present in similar studies. Studies which employ instrumental variables often do not report tests regarding their validity (see Jensen et al. 1992; Noronha et al. 1996; Adedeji 1998; Crutchley et al. 1999; Ding and Murinde 2010, Aggarwal and Kyaw 2010). Furthermore, regression results from some of the aforementioned studies indicate weak instrument problems. A typical example is in Jensen (1992) where the variable fixed assets serving an instrument for leverage is not statistically significant in the leverage equation. Similar cases are reported in the majority of the aforementioned studies. However, instrument validity is not usually discussed or tested. This might be due to the difficulty of finding valid instruments, underlined by Gujarati (2004).

As Woolridge (2006) highlights, invalid instruments can produce poorer results than OLS as the relevant 2SLS and 3SLS estimators can have large standard errors and large asymptotic bias. Therefore, in order to check the robustness of the results, l consider both the results from the OLS estimations and the non-parametric estimations. As non-parametric estimations deal with non-normality issues in our data, they are expected to produce more valid results than OLS.

Table 19 Definition of variables

Variable name	Variable acronym	Description
Leverage	LEV	Sum of long term debt plus short term debt scaled by total assets.
Dividend payout ratio	DIV	Common cash dividends scaled by total assets
Share repurchase	REP	Share repurchase expenditure scaled by total assets
Investment	INV	Capital expenditure scaled by total assets
Profitability	ROA	Return on assets measured as EBITDA scaled by total assets
Cash balance	CASH	Cash and cash equivalents scaled by total assets
Free cash flow	FCF	Cash flow from operations scaled by total assets
Firm risk	BETA	Firm's market beta
Collateral	COLTRL	Assets that can be used as collateral measured as net property, plant and equipment scaled by total assets
Bankruptcy risk	ZSCORE	Altman's Z score calculated as $Z = 1.2\frac{Working\ Capital}{Total\ Assets} + 1.4\frac{Retained\ Earnings}{Total\ Assets} + 3.3\frac{EBIT}{Total\ Assets} + 0.6\frac{MarketValue\ of\ Equity}{Total\ Liabilities} + .999\frac{Sales}{Total\ Assets}$
Firm size	SIZE	Logarithm of sales
Growth opportunities	GROWTH	Sales Growth calculated as $logSALES_t - logSALES_{t-1}$
Depreciation	DEPRC	Depreciation scaled by total assets
Total stock return	RETURN	Stock's return calculated as the Log RI_{t+1} - $LogRI_t$, where RI is the stock's return index from Datastream. The return index presents the theoretical growth in value of a theoretical stock holding. This holding is deemed to return a daily dividend, which is used to purchase new units of the stock at the current price. The gross dividend is used. RI on the base date =100, then: $RI_t = RI_{t-1}*(Pi_t/PI_{t-1})*(1+D*N-1)$, Where: RI_t= return index on day t, RI_{t-1}= return index on previous day, PI_t= price index on day t, PI_{t-1} = price index on previous day, D= dividend yield % on day t, N = number of working days in the year (taken to be 260).
Stock options expense	OPTIONS	Stock options expense scaled by total assets
Stock liquidity	SLIQ	Annual trading volume scaled by the number of common shares outstanding

Table 20 Descriptive statistics-UK sample

2005-2008						2008-2011					
Variable	Obs	Mean	Std. Dev.	Min	Max	Variable	Obs	Mean	Std. Dev.	Min	Max
DIV	214	0.03	0.04	0.00	0.53	DIV	214	0.03	0.03	0.00	0.13
REP	214	0.02	0.04	0.00	0.45	REP	214	0.01	0.02	0.00	0.15
INV	214	0.05	0.04	0.00	0.14	INV	214	0.04	0.04	0.00	0.26
LEV	214	0.22	0.15	0.00	0.80	LEV	214	0.21	0.15	0.00	0.77
ROA	214	0.14	0.08	-0.06	0.93	ROA	214	0.13	0.08	-0.12	0.38
DEPR	214	0.04	0.03	0.00	0.80	DEPR	214	0.04	0.03	0.00	0.19
COLTRL	214	0.26	0.22	0.00	0.21	COLTRL	214	0.25	0.22	0.00	0.91
RETURN	214	-0.03	0.08	-0.42	0.15	RETURN	214	0.00	0.09	-0.47	0.21
OPTION	214	0.29	0.32	-0.08	2.03	OPTION	214	0.27	0.32	-0.01	2.84
CASH	214	0.11	0.10	0.00	0.58	CASH	214	0.11	0.10	0.00	0.63
FCF	214	0.10	0.07	-0.12	0.34	FCF8	214	0.10	0.06	-0.04	0.28
GROWTH	214	0.05	0.07	-0.25	8.28	GROWTH	214	0.03	0.04	-0.17	0.17
SLIQ	214	1.45	1.23	0.12	0.40	SLIQ	214	0.90	0.72	0.03	7.52
ZSCORE	214	1.88	0.97	-1.90	12.35	ZSCORE	214	1.82	0.90	-0.48	4.67
SIZE	214	5.92	0.73	4.40	4.90	SIZE	214	6.00	0.73	4.71	8.38

LEV: Sum of long term debt plus short term debt scaled by total assets, DIV: Common cash dividends to total assets, *REP*: Stock repurchases to total assets, *INV*: capital expenditures to total assets, *ROA*: EBITDA to total assets, *FCF*: cash flow from operations scaled by total assets, CASH: cash and cash equivalents to total assets, *BETA*: stock's beta, *COLTRL*: net property, plant and equipment to total assets, *ZSCORE*: Altman's Z score, *SIZE*: logarithm of sales, *GROWTH*: sales growth (logSALESt – logSALESt-1), *DEPRC*: depreciation to total assets, *RETURN*: stock's return calculated as the Log RI year1 -LogRI year0, where RI is the stock's return index from Datastream, *OPTIONS*: Stock options expense to total assets

Table 21 Difference in variables' means 2005-08 and 2008-11, UK sample

		Mean		Ho: mean difference = 0
Variable	**Obs.**	**2005-08**	**2008-011**	**Pr(|T| > |t|)**
DIV	214	0.033	0.028	0.048
REP	214	0.019	0.008	0.000
INV	214	0.048	0.041	0.000
LEV	214	0.221	0.213	0.061
ROA	214	0.142	0.128	0.000
DEPR	214	0.039	0.040	0.022
COLTRL	214	0.256	0.250	0.063
RETURN	214	-0.031	-0.004	0.000
OPTION	214	0.289	0.268	0.074
CASH	214	0.114	0.110	0.353
FCF	214	0.102	0.102	0.916
GROWTH	214	0.045	0.028	0.000
SLIQ	214	1.449	0.903	0.000
ZSCORE	214	1.880	1.824	0.000
SIZE	214	5.916	6.004	0.053

ROA: EBITDA to total assets, *FCF*: cash and cash equivalents to total assets, *BETA*: stock's beta, *COLTRL*: net property, plant and equipment to total assets, *ZSCORE*: Altman's Z score, *SIZE*: logarithm of sales, *GROWTH*: sales growth (logSALESt – logSALESt-1), *DEPRC*: depreciation to total assets, *RETURN*: stock's return calculated as the Log RI year1 - LogRI year0, where RI is the stock's return index from Datastream, *OPTIONS*: Stock options expense to total assets, SLIQ: annual trading volume to number of common shares outstanding

Table 22 Normality tests-UK sample

	2005-2008				2008-2011			
Variable	Obs	Pr(Skewness)	Pr(Kurtosis)	Joint Test Prob>chi2	Obs	Pr(Skewness)	Pr(Kurtosis)	Joint Test Prob>chi2
DIV	214	0.00	0.00	0.00	214	0.00	0.00	0.00
ROA	214	0.00	0.00	0.00	214	0.08	0.01	0.01
DEPR	214	0.00	0.00	0.00	214	0.00	0.00	0.00
INV	214	0.00	0.00	0.00	214	0.00	0.00	0.00
COLTRL	214	0.00	0.05	0.00	214	0.00	0.07	0.00
LEV	214	0.00	0.13	0.00	214	0.00	0.13	0.00
REP	214	0.00	0.00	0.00	214	0.00	0.00	0.00
RETURN	214	0.00	0.00	0.00	214	0.00	0.00	0.00
OPTION	214	0.00	0.00	0.00	214	0.00	0.00	0.00
CASH	214	0.00	0.00	0.00	214	0.00	0.00	0.00
FCF	214	0.00	0.00	0.00	214	0.00	0.02	0.00
SIZE	214	0.01	0.88	0.05	214	0.00	0.99	0.02
GROWTH	214	0.16	0.00	0.00	214	0.01	0.00	0.00
SLIQ	214	0.00	0.00	0.00	214	0.00	0.00	0.00
ZSCORE	214	0.78	0.00	0.01	214	0.01	0.09	0.01
BETA	214	0.00	0.64	0.01	214	0.00	0.64	0.01

ROA: EBITDA to total assets, *FCF*: cash and cash equivalents to total assets, *BETA*: stock's beta, *COLTRL*: net property, plant and equipment to total assets, *ZSCORE*: Altman's Z score, *SIZE*: logarithm of sales, *GROWTH*: sales growth (logSALESt – logSALESt-1), *DEPRC*: depreciation to total assets, *RETURN*: stock's return calculated as the Log RI year1 -LogRI year0, where RI is the stock's return index from Datastream, *OPTIONS*: Stock options expense to total assets, SLIQ: annual trading volume to number of common shares outstanding

4.4 Findings and analysis

Tables 22-27 present the results from the OLS, 2SLS, 3SLS regressions, median regressions and regression with bootstrapped standard errors. In general, the employed methodologies have produced generally similar results with a few differences regarding interactions between financial decisions. Results differ mainly between methods, which deal with endogeneity (2SLS, 3SLS), and methods which do not (OLS, median regression, regression with bootstrapped standard errors).

4.4.1 Non-parametric estimations

Tables 22-24 report the non-parametric estimation results.

Both the median and the bootstrapping regression show that share repurchases do not have an impact on dividends and leverage in both periods, as the respective coefficients are statistically insignificant. This indicates that in the UK share repurchases do not serve as dividend substitutes as suggested by Grullon and Michaely (2002). In addition, the UK findings do not lend support to concerns that share repurchases can lead to the excessive leverage of companies (see Foroohar 2013). Moreover, share repurchases do not seem to influence investment in 2008-11. However, our findings show that share repurchases have a statistically significant negative effect on investment in 2005-08. This is in accordance with the Budget Constraint Theory of McCabe (1979) where share repurchases as a use of funds has a negative impact on another use of funds (i.e. investment).

The effect of dividends on investment is not consistent between periods. Dividends do not have a statistically significant impact on investment in the 2005-8 period according to both non-parametric estimations methods. However, dividends seem to have a negative impact on investment in the 2008-11 period. The coefficient of dividends is negative in both estimation techniques but only statistically significant in the bootstrapping regression. This difference between periods can be attributed to the post-crisis environment. The lack of liquidity in 2008-11 might strengthen the competition between share dividends and investment for the same limited financial resources.

Dividends in the UK do not seem to impact on share repurchases. According to both non-parametric estimations in 2005-08, dividends' effect on share repurchases is statistically insignificant. There is an indication that in 2008-11, dividends have a positive effect on share repurchases as the relevant coefficients are both positive. However, the coefficient is statistically significant only in the median regression. Again, results are against the dividend substitution hypothesis by Grullon and Michaely (2002).

Finally, the effect of dividends on leverage is not consistent between periods. In 2005-08, the median regression shows that dividends have a positive effect on leverage. This supports the Budget Constraint Theory of McCabe (1979) as a greater use of dividends leads to a greater use in debt financing. It is also supportive of the Pecking Order Theory, which suggests that firms with higher dividend payout ratios will have lower retained earnings and thus need to rely more on debt financing to fund investment opportunities. In 2008-11, the coefficient on dividends is insignificant in both the median and the bootstrapping estimations.

Leverage does not seem to impact on investment. The respective coefficient in the investment equation is statistically insignificant it both periods and across both non-parametric estimation techniques. In addition, according to both non-parametric estimation methods leverage does not seem to have an effect on dividends in 2005-08. However, in 2008-11 the median regression estimation shows a negative and statistically significant effect of leverage on dividends. This is in line to the Free Cash Flows Theory. In the post crisis environment with scarce investment opportunities firms might choose debt over dividends as a more binding mechanism to reduce resources under

managerial control. The findings do not show an effect of leverage on share repurchases in 2008-11. However, the bootstrapping regression shows a positive and statistically significant effect of leverage on share repurchases in 2005-08. This is supportive of the Budget Constraint Theory of McCabe (1979) where sources of funds (i.e leverage) have a positive impact on uses of funds (i.e share repurchases).

Investment has a robust negative impact on dividends in both periods. In support of the Budget Constraint theory, the coefficient of the investment variable in the dividend non-parametric regressions is always negative and statistically significant with the exception of the median regression in 2005-08. In addition, investment does not appear to have an effect on share repurchases in 2008-11, as the respective coefficient in the share repurchase equation is generally statistically insignificant. However, investment appears to have a negative effect on share repurchases in 2005-08. Finally, the non-parametric estimations have produced incosistent results regarding the effect of investment on leverage. In 2008-11, this effect seems to be negative while in 2005-08 it appears to be positive (only in the bootstrapping regression). It seems that in the post crisis period firms might draw funds from reducing share repurchases and dividends instead of levering up. Since raising debt is a binding choice of financing this would provide firms with financial flexibility which is considered significant in periods of uncertainty. On the contrary, in the pre crisis period where financial flexibility is expected be of lesser importance, an increase in investment is associated with an increase in leverage as supported by the Budget Constraint Theory of McCabe (1979) and the Pecking Order Theory.

As far the control variables are concerned, we observe no disparities between findings from the non-parametric estimations and earlier research. More specifically, in line with Free Cash Flow Theory, the effect of free cash flows on share repurchases is consistently positive and statistically significant on both non-parametric estimations (median and bootstrapped standard errors regressions) for both periods. This relationship is supported by earlier studies on UK firms (see Oswald and Young 2008; Dixon et al. 2008; Dhanani and Roberts 2009). Moreover, the findings confirm the significance of stock options and firm size. The coefficient on stock options is consistently positive and statistically significant supporting the option-funding hypothesis of Kahle (2000). Therefore, it seems that share repurchases in the UK are used flexibly to fund stock options and/or reduce free cash flows. Finally, contrary to our expectations firm size seems to have a positive effect on share repurchases. We expected smaller firms to be more prone to undervaluation and utilize share repurchases to signal positive information to the market. Dittmar (2000) finds the same unexpected positive relationship between size and share repurchases. The author suggests that this could be because larger firms are also likely to be misvalued and use share repurchases to take advantage of possible undervaluation. Regarding the stock return variable it is seldom negative and statistical significant as in Dittmar (2000). As the author argues this could be attributed to the fact that we are not using quarterly data which might better capture the potential undervaluation motive. However, this could be due to the effect of the strict UK regulatory framework on share repurchases. Rau and Vermaelen (2002) argue that due to this UK companies find it more difficult than their US counterparts to use open market repurchases to exploit perceived undervaluation. The UK regulatory framework

described by Rau and Vermaelen (2002) became even stricter by 2004. As reported earlier the implementation of The EU Market Abuse Directive 2003/6/EC (MAD) 29 increased the risk of facing market manipulation charges when compared to the old safe harbour provisions (Siems and De Cesari 2012). The variables cash holdings and stock liquidity do not appear to have an effect on share repurchases. Finally, both the median regressions and the bootstrapping regressions show a negative coefficient on GROWTH. This negative effect is in line to Rozeff (1982) and Crutchley et al (1999) as growing firms are expected to retain earnings instead of distributing them in order to avoid the costs of external financing.

We confirm free cash flows (FCF) and profitability (ROA) as dividend determinants. These variables have a consistent positive effect on dividends in line with the Free Cash Flow Theory and the Pecking Order Theory respectively. This supports earlier findings by Jensen et al. (1992), and Aggarwal and Kyaw (2010). In addition, growth opportunities (GROWTH) are related consistently and negatively to dividends, which is in line with the Pecking Order Theory. Finally, firm size and firm risk have the expected positive and negative effect respectively but are not statistically significant.

In the leverage regressions both bootstrapping and median regressions identify bankruptcy risk (ZSCORE), firm size (SIZE) as capital structure determinants. Bankruptcy risk has a negative impact while size a positive one. These relationships are in accordance to the Trade Off theory. This result is in line with findings by Frank and Goyal (2009) and supports their contention that Altman's Z-score is one of the most reliable capital structure determinants. In addition, non-parametric estimations indicate collateral (COLTRL) as a leverage determinant. Collateral (COLTRL) is positive and

statistically significant in both bootstrapping and median estimations. This supports Jensen (1976) who argues that firms with tangible assets can use them as collateral when a firm is taking on debt, thus reducing debt's agency costs. Profitability (ROA) seems to have an effect on capital structure only in the 2005-08 period. Its impact on capital structure is positive which is supportive of the Trade Off Theory. According to the Trade Off theory profitable firms might use debt in order to exploit tax shields. However, in 2008-11 profitability is not statistically significant. In part, this might be related to the significantly lower profitability of firms during 2008-2011, which might have reduced the potential benefits derived from leverage tax shields. Moreover, in this period of economic uncertainty many firms held back on investment projects, both due to increased costs and due to unavailability of funding or because of uncertainty about the development of the domestic and global demand and prices.

Variables related to financial distress and probability of default retain their significance e.g (ZSCORE), (SIZE), (COLTRL). The free cash flow (FCF) variable has a negative effect on leverage in 2005-8 indicating that in the pre crisis period UK firms did not use debt as a mechanism to reduce agency costs of free cash flows. However, after the credit crunch both parametric and non-parametric tests suggest no significant relationship between leverage and free cash flow. This resembles the profitability (ROA) results and may indicate that in the post crisis period UK firms are trying to maintain their liquidity due to difficulties in raising external finance and economic uncertainty. The Growth opportunities (GROWTH) variable does not seem to have a significant effect on leverage.

In the investment equation profitability (ROA), size (SIZE) and depreciation (DEPRC) have the expected positive effect on investment and are statistically significant in both periods. The documented positive effect of profitability on capital investment is in line with the contention of McCabe (1979) that sources of funds (earnings) have a positive effect on uses of funds (investment). According to McCabe (1979), depreciation identifies cash flows, which can be used to fund investment. This result is also in accordance with Abel and Eberly (2012) who argue that, as the depreciation rate reflects the users' cost of capital, investment is a linear function of the depreciation rate. The positive impact of the firm size (SIZE) variable indicates that larger firms invest more. Finally, the growth variable (GROWTH) does not seem to have an effect on investment.

4.4.2 Parametric estimations

Tables 25-27 present results from the parametric estimations (OLS, 2SLS and 3SLS). The parametric methods, which deal with endogeneity (2SLS, 3SLS), have produced similar results. However, there are some differences between these methods and OLS. This can be attributed to the impact of weak instruments as suggested by the relevant tests reported earlier in this section. Since the 2SLS and 3SL estimations suffer from weak instruments, the OLS results are more appropriate for inferences. Furthermore, the OLS results are very similar to the non-parametric results (median regression and regression with bootstrapped standard errors). This indicates that the non-normality of the data was not severe enough to distort significantly the OLS results.

Share repurchases do not seem to influence other key financial decisions according to the 2SLS and 3SL estimations. The findings show that share repurchases do not have a statistically significant effect on investment and dividends. This applies to both periods, before and after the credit crunch, as the respective coefficient of share repurchases on both the investment and dividend equation is consistently statistically insignificant. Only OLS results indicate a negative effect on investment in 2005-08. As reported earlier this is also supported by the non-parametric results. Regarding the effect of share repurchases on leverage results are inconsistent. Share repurchases appear only to have a negative effect on leverage in 2008-11 as the respective 2SLS and 3SLS coefficients are statistically significant. Yet, this relationship is insignificant in OLS and both non-parametric estimations. Thus, the UK findings do not lend support that share repurchases can lead to the excessive leverage of companies (see FINNOV 2012; Foroohar 2013). Moreover, our results do not show evidence of dividend substitution by share repurchases.

However, there is evidence which suggest that share repurchases have a negative impact on investment. These supports concerns that share repurchases can be detrimental to firms' ability to create value through investment (see FINNOV 2012).

Dividends seem to have a negative impact on investment. This relationship appears be more evident in the post crisis period 2008-11 than in 2005-08. More specifically, OLS, 2SLS, 3SLS and bootstrapping regressions show a negative and statistically significant effect of dividends on investment and vice versa. This confirms earlier results of Adedeji (1998) for UK firms and is in line with McCabe's (1979) Budget Constraint theory, as dividends and investment appear to be competing uses of funds. The fact that dividends appear to have a negative effect on investment after the credit crunch supports economists' concerns raised about funds available for investment in times of recession (see House of Commons Trade and Industry report 1994; Griffiths and Wall, 2007). In the pre crisis periods, only OLS, 2SLS and 3SLS support the negative effect of dividends on investment. However, as suggested later the 2SL and 3SLS results should be treated with caution, as they are likely to suffer from weak instrument problems, while the OLS estimations do not account for the non-normality of the data.

Dividends seem to have a positive effect on share repurchases according to 2SLS and 3SLS in both periods and OLS in 2008-11. The same is suggested by the median regression in 2008-11. This is against to what most theories would support and against the dividend substitution hypothesis suggested by Grullon and Michaely (2002).

Finally, 2SLS and 3SLS indicate that dividends have a positive effect on

leverage for the period before the credit crunch, since both the 2SLS and 3SLS estimations in 2005-08 show a strong positive and statistically significant impact. This relationship is also supported by the median regression in 2005-08. This is in line with the Budget Constraint Theory of McCabe (1979) as a greater use of funds requires additional sources of funds. However, the impact of dividends on leverage is not statistically significant in the 2008-11 period. This may indicate that in 2008-11, firms did not lever up to fund dividend increases. Instead, they appear to have rather cut investment or share repurchases or use retained earnings.

OLS, 2SLS and 3SLS show that capital structure does not seem to have an effect on payout policies in 2008-11. The same is supported by the non-parametric estimations. However, the OLS and bootstrapping estimation in 2005-08 indicate a positive effect. This is in line to the Budget Constraint Theory. Likewise, the findings do not show an effect of leverage on dividends. The impact of leverage on dividends is statistically insignificant in all cases but one, the 3SLS estimation in 2005-08. In addition, it appears that leverage does not impact on investment. In accordance to the Budget Constraint Theory the coefficient of leverage on the investment equation is generally positive however in most cases statistically insignificant. The same is supported by the non-parametric estimations. It seems that in the UK, the financing need associated with increases in investment and payouts does not lead to increases in capital structure in the long term. Dividends and investment might be funded by respective reductions of one another. This is supported by the documented negative impact of dividends on investment reported earlier. The negative impact of investment on dividends, which will be reported and discussed briefly in this section, is also in favor of this contention. Since we

observe no similar interaction between share repurchases and dividends and share repurchases and investment, share repurchases might be funded solely by free cash flows.

Investment, as mentioned earlier, seems to impact on dividends. In 2008-11, the coefficient of the investment variable in the dividend and share repurchase equations is consistently negative and statistically significant across both non-parametric and parametric estimation methods. The same applies for 2005-08 where the relevant coefficient is insignificant in the median regression. The indicated negative impact of dividends on investment is in line with McCabe's Budget Constraint Theory.

In addition, investment does not appear to have an effect on share repurchases, as the respective coefficient in the share repurchases equation is generally statistically insignificant. However, as reported earlier non-parametric estimations show a negative impact in 2005-08. Finally, investment does not seem to affect leverage as the coefficient of the investment variable in the leverage equation is statistically insignificant in all cases but one (3LS, 2008-11). On the contrary, non-parametric estimations show a negative effect in 2008-11 and a positive one in2005-08.

Table 23 Summary of non-parametric (median and bootstrapping) estimation results - Dependent variables, UK sample

2005-08		Median				Bootstrapping			
		INV	DIV	REP	LEV	INV	DIV	REP	LEV
Independent variables	INV		-0.13	-0.07***	-0.01		-0.22***	-0.26***	5.40***
	DIV	0.01		-0.01	0.06*	-0.053		-0.09	-0.37
	REP	-0.13***	0.02		0.60	-0.17*	-0.17		0.30
	LEV	0.01	-0.01	0.01		0.01	0.02	0.03*	
2008-2011		INV	DIV	REP	LEV	INV	DIV	REP	LEV
Independent variables	INV		-0.15***	-0.01	-1.60***		-0.19***	-0.04	-0.82**
	DIV	-0.14		0.06***	-0.24	-0.30**		0.03	0.15
	REP	-0.05	0.04		0.12	-0.07	-0.04		0.42
	LEV	0.01	-0.01***	0.01		-0.01	-0.01	0.01	
	No. observations	214	214	214	214	214	214	214	214

***, **, *** indicate statistical significance at 10%, 5%, 1% level respectively**

LEV: long term debt to total assets (book values), *DIV*: dividend payout (Common Dividends (Cash) to total assets, *REP*: Stock repurchases to total assets, *INV*: capital expenditures to total assets,

Table 24 Non-parametric (median and bootstrapping) estimation results - Control variables 2005-08, UK sample

		Dependent variables							
2005-2008		Median				Bootstrapping			
		INV	DIV	REP	LEV	INV	DIV	REP	LEV
Independent variables	GROWTH	0.01	-0.09***	-0.04**	0.30	0.01	-0.30*	-0.12**	-0.06
	SIZE	0.01***	0.01	0.01***	0.05***	0.01***	0.01	0.01***	0.04***
	ROA	0.10***	0.16***		0.65*	0.20***	0.17***		1.06***
	FCF		0.06*	0.11***	-1.34***		0.23	0.35***	-1.03***
	COLTLR				0.30***				0.18***
	ZSCORE				-0.05***				-0.07***
	BETA		-0.01				-0.01		
	OPTIONS			0.01***				0.04***	
	RETURN			-0.01				-0.01	
	CASH			-0.01				-0.02	
	SLIQ			-0.01				0.01	
	DEPRC	0.87***				0.81***			
	constant	-0.06***	-0.01	-0.03***	-0.03	-0.05***	-0.01	-0.07***	0.02
	No. observations	214	214	214	214	214	214	214	214
	R-squared	0.36	0.25	0.12	0.17	0.54	0.34	0.44	0.32

ROA: EBITDA to total assets, *FCF*: cash flow from operations to total assets, CASH: cash and cash equivalents to total assets, *BETA*: stock's beta, *COLTRL*: net property, plant and equipment to total assets, *ZSCORE*: Altman's Z score, *SIZE*: logarithm of sales, *GROWTH*: sales growth (logSALESt – logSALESt-1), *DEPRC*: depreciation to total assets, *RETURN*: stock's return calculated as the Log RI year1 -LogRI year0, where RI is the stock's return index from Datastream, *OPTIONS*: Stock options expense to total assets.

Table 25 Summary of non-parametric (median and bootstrapping) estimation results - Control variables 2008-11, UK sample

2008-2011		Median				Bootstrapping			
		INV	DIV	REP	LEV	INV	DIV	REP	LEV
Independent variables	GROWTH	-0.08**	-0.10***	-0.01	0.25	0.04	-0.13***	-0.05**	-0.16
	SIZE	0.01**	0.01**	0.01***	0.06***	0.01**	0.01	0.01**	0.04***
	ROA	0.10***	0.13***		0.04	0.19***	0.19***		0.31
	FCF		0.18***	0.02**	0.41		0.13	0.13**	0.02
	COLTLR				0.35***				0.21***
	ZSCORE				-0.07***				-0.07***
	BETA		-0.01**				-0.01		
	OPTIONS			0.01***				0.01	
	RETURN			-0.01				0.01	
	CASH			0.01				0.01	
	SLIQ			0.01				10.01	
	DEPRC	0.63***				0.51***			
	constant	-0.03**	-0.01	-0.01***	-0.07	-0.03*	0.01	-0.03***	0.01
	No. observations	214	214	214	214	214	214	214	214
	R-squared	0.27	0.37	0.13	0.17	0.37	0.52	0.33	0.30

ROA: EBITDA to total assets, *FCF*: cash flow from operations to total assets, CASH: cash and cash equivalents to total assets, *BETA*: stock's beta, *COLTRL*: net property, plant and equipment to total assets, *ZSCORE*: Altman's Z score, *SIZE*: logarithm of sales, *GROWTH*: sales growth (logSALESt – logSALESt-1), *DEPRC*: depreciation to total assets, *RETURN*: stock's return calculated as the Log RI year1 -LogRI year0, where RI is the stock's return index from Datastream, *OPTIONS*: Stock options expense to total assets.

Table 26 Summary of OLS, 2SLS and 3SLS regression statistics - Dependent variables, UK sample

2005-2008		Dependent Variables											
		OLS				2SLS				3SLS			
		INV	DIV	REP	LEV	INV	DIV	REP	LEV	INV	DIV	REP	LEV
Independent variables	INV		-0.15***	-0.15***	-0.18		-0.21***	-0.02	2.64		-0.42***	0.06	5.40***
	DIV	-0.14		0.08	0.20	-1.02**		0.51***	9.36**	-1.48***		0.45**	15.16***
	REP	-0.24***	0.01		0.27	0.05	0.03		-0.92	0.22	0.08		-1.70
	LEV	0.01	-0.01	0.02*		0.04	0.01	0.02		0.06***	0.04***	-0.01	
2008-2011													
		INV	DIV	REP	LEV	INV	DIV	REP	LEV	INV	DIV	REP	LEV
Independent variables	INV		-0.18***	-0.01	-0.61		-0.24***	0.01	0.98		-0.39***	0.04	1.56
	DIV	-0.36***		0.08**	0.31	-2.07***		0.17**	2.87	-2.07***		0.14**	3.69
	REP	-0.12	0.19*		-0.27	0.80	-0.07		-7.04**	1.35*	0.23		-9.20***
	LEV	-0.01	-0.01	0.01		0.01	-0.02	0.01		0.07**	0.01	-0.01	
	No. observations	214	214	214	214	214	214	214	214	214	214	214	214

*, **, *** indicate statistical significance at 10%, 5%, 1% level respectively

LEV: long term debt to total assets (book values), *DIV*: dividend payout (Common Dividends (Cash) to (Net Income before Preferred Dividends - Preferred Dividend Requirement), *REP*: Stock repurchases to (Net Income before Preferred Dividends - Preferred Dividend Requirement), *INV*: capital expenditures to total assets, all variables have been winsorized at the 5% level

Table 27 Summary of OLS, 2SLS and 3SLS regression statistics - Control variables 2005-08, UK sample

		Dependent variables											
2005-2008		OLS				2SLS				3SLS			
		INV	DIV	REP	LEV	INV	DIV	REP	LEV	INV	DIV	REP	LEV
Independent variables	GROWTH	-0.01	-0.16***	-0.11***	-0.05	-0.12	-0.16***	-0.06	1.28*	-0.18***	-0.1***	-0.04	2.10***
	SIZE	0.01***	0.01	0.01***	0.05***	0.01	0.01	0.01***	0.05*	0.01*	0.01	0.01***	0.01
	ROA	0.23***	0.20***		1.21***	0.40***	0.20***		-0.50	0.50***	0.28***		-2.96***
	FCF		0.09*	0.19***	-1.29***		0.10**	0.14	-2.20**		0.01	0.03	-1.73***
	COLTLR				0.14***				-0.02				0.06
	ZSCORE				-0.08***				-0.10***				-0.06***
	BETA		-0.01				-0.01				-0.01		
	OPTIONS			0.03***				0.03***				0.03***	
	RETURN			0.01				-0.01				-0.01	
	CASH			-0.01				0.01				0.02	
	SLIQ			0.01				0.01				0.01	
	DEPRC	0.77***				0.61***				0.39***			
	constant	-0.06***	-0.01	-0.05***	-0.01	-0.04*	-0.01	-0.06***	0.05	-0.02	-0.01	-0.06***	0.11
	No. observations	214	214	214	214	214	214	214	214	214	214	214	214
	R-squared	0.53	0.48	0.45	0.38	-	-	-	-	-	-	-	-

ROA: EBITDA to total assets, *FCF*: cash and cash equivalents to total assets, *BETA*: stock's beta, *COLTRL*: net property, plant and equipment to total assets, *ZSCORE*: Altman's Z score, *SIZE*: logarithm of sales, *GROWTH*: sales growth (logSALESt – logSALESt-1), *DEPRC*: depreciation to total assets, *RETURN*: stock's return calculated as the Log RI year1 -LogRI year0, where RI is the stock's return index from Datastream, *OPTIONS*: Stock options expense to total assets, all variables have been winsorized at the 5% level

Table 28 Summary of OLS, 2SLS and 3SLS regression statistics - Control variables 2008-11, UK sample

		Dependent variables											
2008-2011		OLS				2SLS				3SLS			
		INV	DIV	REP	LEV	INV	DIV	REP	LEV	INV	DIV	REP	LEV
Independent variables	GROWTH	0.03	-0.12***	-0.02	-0.23	-0.17*	-0.13***	-0.01	-0.27	-0.15*	-0.10***	-0.02*	-0.24
	SIZE	0.01***	0.01	0.01**	0.05***	0.01	0.01	0.01*	0.07***	-0.01	-0.02	0.01***	0.07***
	ROA	0.20***	0.20***		0.36	0.59***	0.21***		-0.02	0.57***	0.26***		-0.38
	FCF		0.08**	0.04**	-0.03		0.11**	0.01	0.19		0.04	0.02	0.19
	COLTLR				0.17***				0.04				0.07
	ZSCORE				-0.08***				-0.08***				-0.06***
	BETA		-0.01				-0.01				-0.01		
	OPTIONS			0.01***				0.01***				0.01***	
	RETURN			0.01				0.04				0.01	
	CASH			0.01				0.01				0.01	
	SLIQ			0.01				0.01*				-0.01	
	DEPRC	0.58***				0.23				0.13			
	constant	-0.04**	-0.01	-0.02***	-0.06	-0.01	-0.01	-0.01***	-0.13	0.01	-0.01	-0.01***	-0.17*
	No. observations	214	214	214	214	214	214	214	214	214	214	214	214
	R-squared	0.43	0.60	0.37	0.32	-	-	-	-	-	-	-	-

ROA: EBITDA to total assets, *FCF*: cash and cash equivalents to total assets, *BETA*: stock's beta, *COLTRL*: net property, plant and equipment to total assets, *ZSCORE*: Altman's Z score, *SIZE*: logarithm of sales, *GROWTH*: sales growth (logSALESt – logSALESt-1), *DEPRC*: depreciation to total assets, *RETURN*: stock's return calculated as the Log RI year1 -LogRI year0, where RI is the stock's return index from Datastream, *OPTIONS*: Stock options expense to total assets. All variables have been winsorized at the 5% level

Table 29 Instrumental variables overidentification and weak identification test-UK sample

	2005-08	
	Overidentification test for all instruments -Sargan statistic (p-values)	Weak identification test - Cragg-Donald Wald F statistic
REP	0.73	1.11
DIV	0.00	2.08
INV	0.00	3.05
LEV	0.00	1.07
	2008-11	
REP	0.00	1.06
DIV	0.04	3.00
INV	0.00	2.30
LEV	0.01	3.01

* The null hypothesis for the overidentification test is that instruments are valid

* As a rule of thumb Cragg-Donald Wald F-statistics below 10 indicate weak instruments (Stock and Yogo, 2005)

Table 30 Share repurchases regressions (2005-08, 2008-11) VIF factors

VIF		
Variable	2005-08	2008-11
FCF	2.98	3.25
DIV	1.74	2.04
OPTION	1.63	1.78
CASH	1.61	1.72
SIZE	1.6	1.5
SLIQ	1.56	1.5
INV	1.48	1.47
GROWTH	1.41	1.44
LEV	1.38	1.42
RETURN	1.28	1.35
Mean VIF	1.67	1.75

LEV: Sum of long term debt plus short term debt scaled by total assets., DIV: Common cash dividends scaled by net income after preferred dividendsto total assets, *REP*: Stock repurchases to total assets, *INV*: capital expenditures to total assets, *ROA*: EBITDA to total assets, *FCF*: cash flow from operations scaled by total assets, CASH: cash and cash equivalents to total assets, *BETA*: stock's beta, *COLTRL*: net property, plant and equipment to total assets, *ZSCORE*: Altman's Z score, *SIZE*: logarithm of sales, *GROWTH*: sales growth (logSALESt – logSALESt-1), *DEPRC*: depreciation to total assets, *RETURN*: stock's return calculated as the Log RI year1 -LogRI year0, where RI is the stock's return index from Datastream, *OPTIONS*: Stock options expense to total assets

Table 31 Investment regressions (2005-08, 2008-11) VIF factors

VIF		
Variable	2005-08	2008-11
ROA	2.62	3.48
DIV	1.9	2.39
REP	1.44	1.46
DEPR	1.33	1.37
GROWTH	1.32	1.34
SIZE	1.18	1.18
LEV	1.11	1.16
Mean VIF	1.56	1.77

LEV: Sum of long term debt plus short term debt scaled by total assets., DIV: Common cash dividends scaled by net income after preferred dividendsto total assets, *REP*: Stock repurchases to total assets, *INV*: capital expenditures to total assets, *ROA*: EBITDA to total assets, *FCF*: cash flow from operations scaled by total assets, CASH: cash and cash equivalents to total assets, *BETA*: stock's beta, *COLTRL*: net property, plant and equipment to total assets, *ZSCORE*: Altman's Z score, *SIZE*: logarithm of sales, *GROWTH*: sales growth (logSALESt – logSALESt-1), *DEPRC*: depreciation to total assets, *RETURN*: stock's return calculated as the Log RI year1 -LogRI year0, where RI is the stock's return index from Datastream, *OPTIONS*: Stock options expense to total assets

Table 32 Leverage regressions (2005-08, 2008-11) VIF factors

Leverage		
Variable	2005-08	2008-11
ROA	6.18	6.74
FCF	5.4	5.32
INV	2.84	2.89
COLTRL	2.19	2.56
DIV	1.93	2.42
REP	1.62	1.42
GROWTH	1.42	1.39
ZSCORE	1.4	1.3
SIZE	1.14	1.09
Mean VIF	2.68	2.79

LEV: Sum of long term debt plus short term debt scaled by total assets., DIV: Common cash dividends scaled by net income after preferred dividendsto total assets, *REP*: Stock repurchases to total assets, *INV*: capital expenditures to total assets, *ROA*: EBITDA to total assets, *FCF*: cash flow from operations scaled by total assets, CASH: cash and cash equivalents to total assets, *BETA*: stock's beta, *COLTRL*: net property, plant and equipment to total assets, *ZSCORE*: Altman's Z score, *SIZE*: logarithm of sales, *GROWTH*: sales growth (logSALESt – logSALESt-1), *DEPRC*: depreciation to total assets, *RETURN*: stock's return calculated as the Log RI year1 -LogRI year0, where RI is the stock's return index from Datastream, *OPTIONS*: Stock options expense to total assets

Table 33 Dividend regressions (2005-08, 2008-11) VIF factors

Dividends		
Variable	2005-08	2008-11
FCF	5.36	5.18
ROA	5	5.16
REP	1.62	1.4
INV	1.59	1.38
SIZE	1.26	1.23
GROWTH	1.22	1.22
LEV	1.19	1.16
BETA	1.08	1.13
Mean VIF	2.29	2.23

LEV: Sum of long term debt plus short term debt scaled by total assets., DIV: Common cash dividends scaled by net income after preferred dividendsto total assets, *REP*: Stock repurchases to total assets, *INV*: capital expenditures to total assets, *ROA*: EBITDA to total assets, *FCF*: cash flow from operations scaled by total assets, CASH: cash and cash equivalents to total assets, *BETA*: stock's beta, *COLTRL*: net property, plant and equipment to total assets, *ZSCORE*: Altman's Z score, *SIZE*: logarithm of sales, *GROWTH*: sales growth (logSALESt – logSALESt-1), *DEPRC*: depreciation to total assets, *RETURN*: stock's return calculated as the Log RI year1 -LogRI year0, where RI is the stock's return index from Datastream, *OPTIONS*: Stock options expense to total assets

As far as the control variables are, concerned parametric and non-parametric results have produced quite similar results.

Regarding share repurchases, the coefficient on the Free Cash Flows variable is consistently positive across periods in and parametric estimation techniques however it is statistically significant only in the OLS estimations[27]. Nevertheless, as reported earlier, the effect of free cash flows on share repurchases is consistently positive and statistically significant on both non-parametric estimations (median and bootstrapped standard errors regressions) for both periods. Similar is the case with the GROWTH variable. Regarding share repurchase determinants OLS, 2SLS and 3SLS confirm the significance of stock options and firm size. Parametric estimations support the counter-EPS dilution motive as they show a consistent positive effect of stock options on

[27] The effect of free cash flows on share repurchases is consistently positive and statistically significant on both non-parametric estimations (median and bootstrapped standard errors regressions) for both periods

share repurchases. This is in line with findings by Fenn and Liang (1999) and Kahle (2000). The aforementioned findings suggest that UK firms utilize share repurchases to flexibly fund stock options and/or reduce free cash flows. Finally, as in the case of the non-parametric estimations and contrary to our expectations firm size seems to have a positive effect on share repurchases.

Parametric estimations also confirm free cash flows (FCF) and profitability (ROA) as dividend determinants. These variables have a consistent positive effect on dividends in line with the Free Cash Flow Theory and the Pecking Order Theory respectively. This supports earlier findings by Jensen et al. (1992), and Aggarwal and Kyaw (2010). In addition, growth opportunities (GROWTH) are consistently negatively related to dividends, which is in line with the Pecking Order Theory. Finally, firm size and firm risk have the expected positive and negative effect respectively but are not statistically significant.

Regarding leverage determinants the results show that the firm bankruptcy risk (ZSCORE) variable is consistently negatively signed and statistically significant. The ZSCORE variable has the expected negative effect on leverage consistent with Trade Off Theory, which indicates that firms avoid debt financing as their bankruptcy risk increases. This result is in line with findings by Frank and Goyal (2009) and supports their contention that Altman's Z-score is one of the most reliable capital structure determinants. Firm size (SIZE) has a consistent positive and statistically significant positive effect on leverage in 2008-11. This appears to be in line with the Trade-Off Theory. After the credit crunch larger firms, which are expected to have a lower default probability, might had easier access to debt financing. Profitability (ROA) and collateral (COLTRL) do not seem to have an effect on capital structure, as the

related coefficients are not always statistically significant. In addition, it seems that firms do not utilize debt as a mechanism to reduce agency costs of free cash flows. The FCF variable is negatively signed, though it is not consistently significant. The Growth opportunities (GROWTH) variable does not seem to have a significant effect on leverage.

In the investment equation profitability (ROA) has the expected positive effect on investment and is statistically significant across periods and estimation techniques. The documented positive effect of profitability on capital investment is in line with the contention of McCabe (1979) that sources of funds (earnings) have a positive effect on uses of funds (investment). The depreciation (DEPRC) variable has a positive and statistically significant effect on investment in 2005-2008. The effect is still positive in 2008-11 but it is statistically significant only in the OLS regression. According to McCabe (1979), depreciation identifies cash flows, which can be used to fund investment. This result is also in accordance with Abel and Eberly (2012) who argue that, as the depreciation rate reflects the users' cost of capital, investment is a linear function of the depreciation rate. The firm size (SIZE) variable does not seem to have a consistent and statistically significant effect on investment. Finally, the growth variable (GROWTH) has an unexpected negative coefficient. However, this appears to be statistically significant in the 2SLS and 3SLS estimations.

Summarizing, the results indicate that, unlike in the US, share repurchases in the UK are not well integrated into firms' financial decision-making. The differences in financial decision-making between the UK and the US setting justifies the contention that a different market might lead to different findings,

as supported by a number of studies (see Rajan and Zingales 1995; Bond et al., 1996; Short and Keasey 1999; La Porta et al., 2000 Armour et al. 2002; Dhanani 2005; Bennedsen & Nielsen 2010). More specifically, we do not find evidence of dividend substitution in UK firms, as share repurchases do not seem to have an effect of dividends. It appears that in the UK share repurchases are used as a complement form of payout and not as a substitute. Moreover, our findings do not support concerns that share repurchases lead to the excessive leverage of companies (see Foroohar, 2013) as share repurchases do not seem to affect leverage. However, we find evidence that share repurchases can have a negative influence on investment, a concern expressed by FINNOV (2012). However, unlike the US this relationship appears to be valid only in the pre crisis period (2005-08). Regarding share repurchase determinants, we find that the Free Cash Flows Theory and the option-funding hypothesis seem to drive share repurchases. Therefore, it seems that share repurchases in the UK are used flexibly to fund stock options and/or reduce free cash flows

In addition, we find evidence of interdependence between dividends and investment confirming earlier results of Adedeji (1998). The documented negative interaction between dividends and investment suggests that they are competing uses of funds and is supportive of McCabe's Budget Constraint Theory. The fact that dividends appear to have a negative effect on investment even after the credit crunch supports economists' concerns raised about funds available for investment in times of recession (see House of Commons Trade and Industry report 1994; Griffiths and Wall, 2007). Furthermore, using recent data 2005-2011, we confirm that extant theories can explain the determinants of each financial decision. Regarding dividends

the impact of free cash flows, profitability and growth opportunities is in accordance to the Free Cash Flows Theory and the Pecking Order Theory. Trade-Off Theory seems to be the dominant theory regarding capital structure, as its main determinants seem to be bankruptcy risk and firm size. Finally, profitability and depreciation highlight the importance of financial constraints and the influence of the depreciation rate on investment.

4.5 Conclusion

This chapter sought to empirically assess if concerns that share repurchases in the UK can be detrimental to firms' ability to create value through investment and lead to the excessive leverage of companies (see FINNOV 2012; Foroohar 2013) are substantiated. In addition, the UK market has provided us with an appealing research setting to compare our US findings, due to similarities and differences between the two markets.

This chapter contributes to our understanding of the integration of share repurchases into UK financial decision-making and thus is of importance to investors and regulators. In contrast to the US findings, I do not find evidence of dividend substitution. It seems that in the UK share repurchases are used as complements to dividends rather than substitutes. Moreover, this study does not provide empirical support to concerns that share repurchases can lead to excessive leverage of companies (see Foroohar, 2013). However, I do find evidence which support FINNOV's (2012) concerns that share repurchases can be associated with distorted incentives such as to mitigate the EPS dilution effect of stock options and can to undermine productive investment (see (FINNOV, 2012 a,b). More specifically, I document a negative interaction between share repurchases and investment and confirm stock options as a

significant share repurchase determinant. However, the interaction between investment and share repurchases holds only in the pre crisis period (2005-08). Moreover, the fact that growth opportunities are related consistently and negatively to share repurchases mitigates these concerns to some extent. In general, our results do not show that share repurchases are systematically integrated into UK financial decision-making. It seems that share repurchases are used flexibly to fund stock options and/or reduce free cash flows.

Considering the frequency and magnitude of share repurchases in the UK our findings concern not only domestic but also foreign investors. Since 2008, foreign investors hold almost half of UK quoted shares (OEE, 2013). Of further importance to investors and regulators as well is the documented negative interaction between dividends and investment. The fact that dividends appear to have a negative effect on investment even after the credit crunch supports economists' concerns raised about funds available for investment in times of recession (see House of Commons Trade and Industry report 1994; Griffiths and Wall, 2007). The interdependence between dividends and investment should also concern researchers as the relevant endogeneity concerns should be accounted for in future research.

As far as the control variables are concerned, we observe no disparities with previous evidence. We confirm a negative relationship between leverage and bankruptcy risk and leverage and free cash flows. In addition, growth opportunities, profitability, and free cash flows have a significant effect on dividends. Finally, profitability and depreciation have a positive effect on investment.

In this study, we have employed a number of different estimations techniques to check the robustness of our findings. More specifically, we have employed both parametric (OLS, 2SLS, 3SLS) and non-parametric estimations (median regressions and regressions with bootstrapped standard errors). As our instrumental variables appear to be weak in every equation and hence may perform poorly (see Gujarati 2004; Stock and Yogo 2005) we based our conclusions on our non-parametric estimations. Nevertheless, we did not observe significant differences between different estimation methods, which suggests that our findings are robust.

This research so far indicates that US and UK listed firms display noticeable differences in their financial decision-making. So indeed, the different regulatory and institutional setting of the UK market produced different results from the US one. Therefore it might be that these differences can be attributed to differences in institutional characteristics as supported by a number of studies (see Rajan and Zingales 1995; Bond et al., 1996; Short and Keasey 1999; Armour et al. 2002; Dhanani 2005). However, in the US chapter I use a sample of non-financial companies from the S&P 500 index, whereas in the UK Chapter the sample uses non-financial companies from the FTSE All Share Index. Therefore, the US-UK difference can also be attributed to the smaller size and/or different firm characteristics of UK firms. We will investigate the extent to which these differences are driven by country specific factors or firm size in the next chapter of this thesis.

5. The integration of share repurchases into US and UK firms financial decision-making. Do country specific factors matter?

5.1 Introduction

So far, this research indicates that there are similarities but also significant differences in the factors, which drive key financial decisions, in particular share repurchases, between the USA and the UK. As far as similarities are concerned, in both the US and the UK I document a negative interdependence between dividends and investment. Moreover, in both countries share repurchases do not seem to influence firms' capital structure. However, while for the USA the findings provide evidence that share repurchases have become an integral part of large firms' financial decision-making; this does not appear to be the case for the UK.

In the US, share repurchases seem to be driven not merely by free cash flows but also by decisions about investment and dividends, and both dividends and investments are in turn affected by share repurchases. This indicates that share repurchases have become an essential consideration when managers take financial decisions in large US firms. Moreover, the fact that these results hold both for the period before and subsequent to the credit crunch suggests that, while firms' overall pay-out ratios fell, in general the credit crunch did not lead managers to marginalize share repurchases over dividend payments or vice versa.

By contrast, the UK research does not support such interdependence between dividends and share repurchases. The findings show that in the UK share repurchases are used as a complementary form of payout and not as a

substitute. Moreover, in the UK the negative interaction between share repurchases and investment is not consistent as it holds only for the pre-crisis period. This suggests that UK firms, contrary to US ones, readjusted their share repurchase policy in light of changing macroeconomic conditions and expectations. In general, the UK findings suggest that share repurchases are not systematically related to managers' other principal financial decisions. UK managers appear to use share repurchases as a flexible mean to reduce free cash flows and/or to fund stock options.

The aforementioned differences support prior literature which suggests that, national differences regarding the development of capital, financial and goods markets, as well as regulatory frameworks and corporate governance systems are likely to influence corporate behaviour (Rajan and Zingales 1995; Bond et al. 1996; Short and Keasey 1999; La Porta et al. 2000; Armour et al. 2002; Dhanani 2005; Bennedsen and Nielsen 2010). However, documented differences could also be attributed to firm characteristics. For example, for the US research we draw on a US sample of non-financial companies included in the S&P 500 index, whereas the UK sample draws on non-financial companies included in the FTSE All Share Index. Consequently, firms in the US sample are on average significantly larger than the firms in the UK sample. Even if I would curtail the UK sample to the FTSE 100 index, a noticeable size difference between the firms in the two different samples would be maintained.

Therefore, the purpose of this chapter is to investigate whether differences between the US and UK results are driven by country specific differences or by differences in firm characteristics. This project seems worthwhile, as it will

contribute to knowledge by indicating the degree to which different cultural, structural or regulatory reasons influence corporate behaviour. This is expected to be of importance to regulators and investors especially in the case of the interaction between share repurchases and other key financial decisions and more specifically investment. US and EU firms have been criticized to use share buybacks as a mean to recycle capital and propping up share prices instead of investing in CAPEX and promoting growth (FINNOV 2012; Laurent 2015). As the frequent use of share repurchases might limits funds available for investment especially in times of recession this is an important issue for regulators and investors. However, if country specific factors do indeed influence corporate behaviour then economist concerns that share repurchases can be detrimental to firms' ability to create value through investment (FINNOV, 2012) should not be generalized. Specifically in the UK, due to the influence of cultural, structural or regulatory reasons these concerns might be alleviated. Furthermore, If differences between the US and UK results stem from differences in firm characteristics this is of importance from a methodological point of view. More specifically, studies which utilise large samples studies, which assume homogeneous corporate behaviour among firms. Large samples are likely to include firms with significantly different firm characteristics, which in turn are likely to lead to heterogeneous corporate behaviour. For example, highly profitable mature firms with low growth opportunities versus in their early years whose growth opportunities exceed their generated income.

Finally, the US and UK findings so far indicate that the financial crisis lead UK firms to readjust their financial policies. However, the earlier chapters did not account for country specific differences. This chapter will investigate the

reactions of US and UK firms to the 2007/08 financial crisis while controlling for time and country specific factors while aiming to gain more insight into their financial decision-making.

The following sections, 5.2 to 5.4, will begin by discussing country-specific differences between the US and the UK in terms of bankruptcy, tax codes and corporate governance. Section 5.5 will consider the impact of the financial crisis on both countries. Consequently, in section 5.6, comparative descriptive statistics will be provided to highlight significant differences in firm characteristics between the US and the UK. In addition, I will consider how the aforementioned differences are likely to influence the four financial decisions under investigation. This will be followed by a description of the chosen methodology and the empirical model. Section 5.7 presents and interprets the findings. Section 5.8 concludes while 5.9 discusses the limitations of this study and suggestions for future research.

5.2 Regulation

The US and the UK display noticeable differences regarding the regulatory frameworks related to certain financial decisions. More specifically, differences in terms of their bankruptcy codes and the regulatory framework for share repurchases have been argued to affect capital structure and share repurchase decisions respectively (Rajan and Zingales 1995; Rau and Vermaelen 2002).

5.2.1 Bankruptcy code

Differences in national bankruptcy codes are expected to affect firms' capital structure (Rajan and Zingales 1995; Acharya et al 2004). In countries with creditor-friendly bankruptcy codes a firms' management will not remain in

charge if the firm enters the bankruptcy process while control rights will be transferred to debtholders (Rajan and Zingales 1995; Franks and Torous 1996). This increases the risk not only to shareholders' rights to the company but also to managers' employment. Therefore, in countries with creditor-friendly bankruptcy codes a firm's management will be more careful to avoid financial distress. By contrast, in countries with shareholder-friendly bankruptcy codes creditor rights are less well protected and managers and shareholders have more time to develop plans to change the operational and financial structure of firms after the firm has declared bankruptcy, even if this at the expense of creditors. Therefore, firms in countries with a creditor-friendly bankruptcy code are expected to rely less on debt financing than firms, which operate in countries with a shareholder-friendly one.

The US and UK bankruptcy codes are diametrically opposed. Rajan and Zingales (1995) note that the US provides incentives to keep firms as going concerns even if this is harmful to the firms' creditors, as some firms are worth more in liquidation than as a going concern. By contrast, the UK code is rather creditor friendly, which increases the risk that firms with cash flow problems which fail to pay their interest or redeem the principal on time are liquidated quickly, even if there would be realistic options to save the firm without expropriating creditors. E.g. in contrast to the UK, in the USA interest and principal payments are suspended for at least 120 days after a firm has been put into bankruptcy protection, while shareholders have the exclusive right to propose a reorganization plan (Acharya et al. 2004).

Research by Rajan and Zingales (1995) indicates that UK firms exhibit lower leverage ratios than their US counterparts. This appears to be in line to the

contention that, more creditor friendly bankruptcy laws lead to lower gearing ratios (Acharya et al. 2004). However, Rajan and Zingales' (1995) findings have produced mixed evidence on this as other G-7 countries exhibit higher leverage ratios than the UK despite also having less equity-friendly codes than the US. This suggests that the UK results could be affected by differences in other known firm specific capital structure determinants such as size, profitability and collateral.

Acharya et al. (2004) suggest that earlier research does not control for asset specificity and that when assets specificity is taken into account results show that differences in national bankruptcy codes can affect the capital structure choice. Acharya et al. (2004) reason that firms with high asset-specificity, i.e. firms with assets, which cannot easily be redeployed by firms outside their industry, ceteris paribus will rely less on debt financing due to the comparatively low potential liquidation values of their assets in the case of bankruptcy. Indeed, findings by Acharya et al. (2004) indicate that firms with high (low) asset-specificity, proxied by plant and equipment , tend to carry less (more) debt in a creditor-friendly bankruptcy code compared to firms operating in countries with equity-friendly bankruptcy codes. However, the effect of asset specificity proxied by plant and equipment reported by Acharya et al (2004) is similar to the effect of collateral proxied by property plant and equipment in earlier research. Empirical research has proxied collateral by property plant and equipment and generally supports the contention that leverage is positively related with collateral (see Rajan and Zingales 1995, Chen 2004, Huang and Song 2006, and Frank and Goyal 2009, Aggarwal and Kyaw 2010). According to Frank and Goyal (2009), collateral is one of the most significant capital structure determinants. Firms with tangible assets can

use them as collateral when a firm is taking on debt, thus reducing debt's agency costs (Jensen, 1976). However, Acharya et al (2004) do not control for collateral. In addition, Acharya et al.'s (2004) proxy (i.e plant and equipment) can be considered dubious as property plant and equipment and plant equipment are likely to be highly collinear and therefore their proxy for asset specificity can also be a proxy collateral.

If bankruptcy codes affect firms' capital structure, then theoretical considerations suggest that they are also likely to affect other financial decisions. For instance, Jensen's (1986) Free Cash Flow theory suggests that debt serves as a mechanism to reduce the agency costs of free cash flows. If, however, firms in countries with creditor-friendly bankruptcy codes are reluctant to pursue high levels of debt funding, they might use high pay-out ratios, rather than debt, to deal with the agency costs of free cash-flow. This might explain why traditionally UK firms have exhibited higher payout ratios and lower leverage than their US counterparts (Dhanani 2005; Rajan and Zingales 1995). Moreover, according to McCabe's (1979) budget constraint hypothesis, lower levels of debt financing means that fewer sources of funds are available for payouts and investment. Under these conditions, the hypothesis suggests a more pronounced negative interdependence between uses of funds.

Consequently, our analysis will examine whether differences between the US and the UK in capital structure and its interrelationships with other key financial decisions can be attributed to country specific differences (i.e. bankruptcy regulation) or whether they are related to sample specific differences in firms' collateral, asset specificity, size and profitability.

5.2.2 Regulation of share repurchases

There are significant differences of the regulatory environments for share repurchases in the UK and the US (Kim et al 2005; Scott 2014; Habbart et al 2014). More specifically, Rau and Vermaelen (2002) point out that the UK has stricter regulations that justifies the more frequent use of share repurchases in the US. Table 28, summarizes differences in share repurchases regulation between the US and the UK.

A first noticeable difference is that share repurchases authorization is more straightforward and less complicated in the US. In the UK, an ordinary resolution of shareholders passed in a general meeting is required for approval. The resolution will set out a share repurchase authorization, which may be general or specific and may be unconditional or subject to specific conditions (Scott, 2014). The authority can at most be given for a five-year period, but in practice, it is usually limited to one year. In addition, the resolution needs to set out explicitly the terms and conditions of the repurchases, which as it will be explained briefly, are subject to strict volume, price and timing restrictions. By contrast, in the US share buybacks usually require only board approval (Dhanani and Roberts 2009, Habbart et al 2014). The fact that share repurchases in the US are essentially at the discretion of the board of directors means that decisions to repurchase are less complicated and can be made on an ad hoc basis. This is likely to allow US firms' management to better coordinate share repurchases with other financial decisions.

Table 34 A Summary of the share repurchases regulations and restriction for share repurchases in the US and the UK

	United States	United Kingdom
Approval	Board of Directors	Shareholder meeting
Timing restriction	None	✓
Price restriction	None	✓
Volume restriction	None	✓
Separate Disclosure	None	✓
Insider Trading	None	✓

Based on Kim et al 2005

Moreover, compared to the USA, the UK Companies Act 2003 has much stricter regulations regarding anti-insider trading rules and disclosure requirements, as well as tighter restrictions on the quantity, timing, price range of share repurchases regarding quantity, timing, price range (Kim et al 2005; Scott 2014). As discussed below, these differences have a direct effect on a firm's ability to exploit undervaluation and on firm's management to expropriate selling shareholders (Kim et al 2005, Habbart et al 2014).

Kim et al (2005) report that in the US, open market share repurchases are regulated by Rule 10b-18. Before the enactment of this rule in 1982, share repurchases regulation was characterised by considerable uncertainties and lack of explicit rules and guidelines. Consequently, repurchasing firms faced an increased risk to be charged with price manipulation. The enactment of Rule 10b-18 provided repurchasing firms with the opportunity for immunity from such charges if certain conditions are met. These conditions, also known as ''safe harbour'' provisions, relate to the timing, price, volume and manner of purchase of the open market share repurchase (see Table 29)

Table 35 Rule 10b-18 safe harbour provisions

Manner of purchase	The purchases generally must be made from or through only one broker or dealer on any single day.
Time of purchase	The purchases must be made within certain time frames during the day.
Purchase price	The price generally must not exceed the highest independent bid or the last independent transaction price, whichever is higher, quoted or reported in the consolidated system at the time the purchase is affected.
Volume of purchases	The volume of shares purchased on any single day must not exceed 25% of the average daily trading volume for the four calendar weeks preceding the week of the purchase; however, once each week the issuer may affect one block purchase (in lieu of purchasing under the 25% limit) if no other Rule 10b-18 purchases are effected that day and the block purchase is not included when calculating a security's four-week average daily trading volume.

Adapted from Habbart et al. (2014, p.6)

However, compliance with the rule's conditions is voluntary. Non-compliance to these rules alone is not illegal. However, if the repurchasing firm does not comply it no longer has safe harbour protection. In addition, the US regulatory framework surrounding share repurchases is characterized by the lack of a mandatory disclosure requirement. Kim and Varaiya (2003) suggest that this can create a conflict of interest between a repurchase firm's insider shareholders and outside shareholders. More specifically, the firm's insiders can sell their shares while the firm is repurchasing its shares at comparatively high prices, as the purchasing drives up the share price in the short-term. However, outside shareholders, who do not know that that the firm is buying back its shares due to the lack of disclosure, might purchase shares as they

perceive the share price increase to be related to firm performance rather than the firm's share trading.

By contrast, in the UK decisions to engage in open market share repurchases have to be reported immediately to the Financial Supervisory Authority (FSA), i.e. the UK's Listing Authority (UKLA). In addition, the FSA has to be informed of the completion of the share repurchase as soon as possible about the number of equity shares purchased, and the highest and lowest purchase prices in a day. These rules are supposed to make shareholders and potential investors aware of the firm's actions and allow them to take more informed investment decisions.

Moreover, the UK has timing restrictions in place to prevent insider trading (Rau and Vermaelen 2002) in particularly sensitive periods. The LSE Model Code prohibits firms to repurchase shares during "close periods", which are non-trading windows when officers and directors are not allowed to trade in their firm's shares. These non-trading windows include the two months before the publication of annual or semi-annual earnings and one month before the publication of quarterly results. Apart from preventing insider trading, Rau and Vermaelen (2002) suggest that these regulations make it more difficult for UK companies to use open market repurchases to exploit perceived undervaluation than their US counterparts.

In conclusion, the regulatory environment for share repurchases in the UK is stricter than that in the USA. While this suggests that share repurchases are likely to be less popular in the UK than in the US it might also explain why the previous research findings indicate that share repurchases are less integrated in financial decision-making in the UK than in the USA. However, the

integration of share repurchases into financial decision-making can also be related to differences in firm specific characteristics between the two samples. Specifically firm size can also affect firms' share repurchase behaviour. Firms in the US sample, drawn from the S&P 500, are expected to be larger than the UK firms drawn from the FTSE ALL-SHARE index. Rajan and Zingales (1995) suggest that the US firms, due to their larger size, will find it easier to obtain external financing, particularly during periods of economic uncertainty, as they tend to be perceived to be less risky. Therefore, US firms will find it easier to fund share repurchases.

Therefore, our analysis will investigate whether differences between the US and the UK in share repurchases and their interrelationships with other key financial decisions can be attributed to differences in the regulatory environment or to sample specific differences (i.e size). As it will be explained later in the methodology section qualitative differences in the share repurchases regulation are likely to be picked up by the inclusion of a country dummy in the share repurchases regressions.

5.3 Taxes

Like bankruptcy rules, differences in taxation are also expected to impact on the capital structure decision-making in different countries. Modigliani and Miller (1963) argue that debt financing has the advantage of interest expenses being tax deductible. Survey research in European and US firms reports that roughly 50% of firm managers describe the "tax advantage of interest deductibility" as an "important or very important" factor affecting capital structure (see Graham and Harvey 2001; Bancel and Mittoo 2004; Brounen et al. 2005). Corporate income tax regulation in the UK and the USA display clear

differences. During 2006-2013 corporate tax rates in the USA remained stable at 40% while in the UK tax rates gradually declined from 30% during 2006-08 to 23% in 2013 (KMPG, 2013). All else equal this differential in the corporate tax income gives US firms stronger incentives to opt for high levels of leverage to shield their income from the higher tax rate. This is in line with the observation by Rajan and Zingales (1995) and Acharya et al (2004) which indicate that US firms exhibit higher gearing ratios than UK firms.

Even though taxes appear to have an effect on capital structure, a large number of studies do not control for tax-rates (Rajan and Zingales 1995; Bevan and Danbolt 2002; Ding and Murinde, 2010). In this study, a tax-rate variable will be included in the capital structure equation in order to avoid misspecification issues and get a better understanding about whether leverage is likely to be affected by unobserved country specific characteristics, or by observable issues, such as differences in tax rates.

As it will be explained in the methodology section, I will incorporate a firm-specific tax-rate variable in order to control for differences in tax rates between the US and the UK. Firm specific tax-rates are affected by differences in the tax-regulation so that US and UK firms with otherwise similar characteristics in relation to e.g. profitability, size, etc. are likely to face different tax rates.

5.4 The 2007-08 Financial Crisis

The global financial crisis originating in 2007 was characterized by a severe shortage of investment capital and liquidity, which influenced firms' financial decisions in the US and in the UK.

In early 2007, due to the subprime mortgage crisis, a number of US subprime lenders and home building firms announced major losses, leading to some of them declaring bankruptcy and (BBC 2008; St Louis Fed 2015). As many of these firms had sold mortgage-backed securities to other financial institutions, this lead to global concerns regarding the stability of the financial sector as more and more banks and insurance firms begun to discover subprime mortgage backed securities in their portfolios. A few months later, in July 2007, investment bank Bear Sterns announced to its investors that it was halting redemptions on two of its hedge funds. Subsequently, on the 9th of August 2007, Investment bank BNP Paribas informed its investors that they would not be able to withdraw money from two of its hedge funds due to a "complete evaporation of liquidity" in the market. This event soon led investors to attempt liquidating assets deposited in highly leveraged financial institutions. The resulting crisis of confidence led to banks becoming reluctant to lend to other banks in the short-term money markets, keeping interbank lending rates persistently high. In the USA a total of 25 banks went bankrupt by 2008 and many banks required bailouts to avoid bankruptcy (BBC 2008; FDIC 2015). In September 2008, the financial crisis entered a severe stage triggered by the collapse of Lehman Brothers.

Concurrently with the US, the UK economy was facing similar issues with failing financial institutions. In mid September 2007 the UK bank Northern Rock experienced a banking run, sought, and received emergency financial support from the Bank of England, which led to its nationalisation. Subsequently, a number of other UK banks and building societies were partly nationalised, as they required large-scale financial support by the UK government in order to avert their bankruptcy (Kingsley, 2012).

The shortening of banks' balance sheets due to falling asset values and stricter capital requirements lead to a severe decrease in personal and corporate credit and a rapid downturn in the housing and construction markets. Firm financing became more expensive, while the reduction in consumer spending due to the recession had a negative impact on cash inflows and profits. These developments severely affected the US and the UK economy as evidenced by movements in their stock markets and real GDP growth (Figures 7 and 8). The U.S. stock market peaked in October 2007, and then entered into a rapid decline until January 2009. The same pattern is present regarding growth in real GDP (Figure 8). From Figures 7 and 8 it is evident that the US and the UK economies followed a very similar course.

Both the US and the UK governments employed a range of means to deal with the financial crisis, including lowering interest rates, enacting Quantitative Easing (QE) programmes and providing bank bailouts. Both central banks reduced interest rates to stimulate the economy. In the UK, the base rate was cut from 5.5% in 2007 to 0.5% in 2009. Similarly, in the US the FED rate was reduced from 5.25% in 2007 to 0.25% in 2008. In addition, both countries implemented Quantitative Easing (QE) programmes to stimulate the economy.

Between November 2008 and October 2014, the Federal Reserve engaged in three rounds of QE to stimulate the US economy. As part of its QE policy, the Federal Reserve accumulated 4.5 trillion dollars in assets during this period (Hilsenrath, 2014). At a rather smaller scale, the Bank of England purchased 375 billion pounds of assets between March 2009 and July 2012 (Bank of England, 2014).

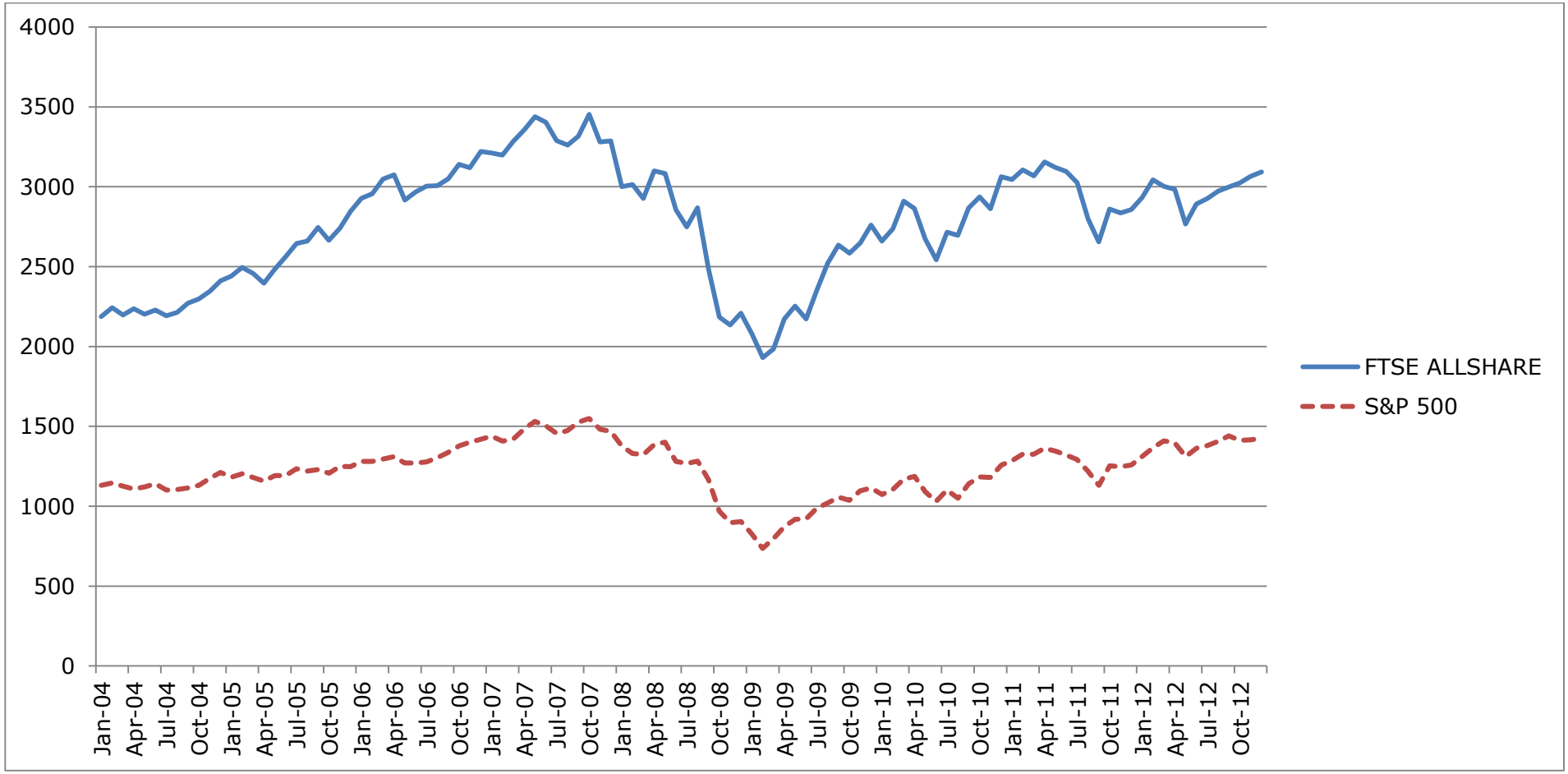
Falling demand, difficulties accessing external finance and generating income as well as the lack of investment opportunities are all expected to have a direct impact on firms' key financial decisions investigated in this study, namely decisions about investment, capital structure, share repurchases and dividends. I expect the impact of the financial crisis on companies in the US and the UK to differ because of their different institutional and economic environments and the different scales of government interventions.

However, some of the differences regarding the impact of the financial crisis on firms' decision-making I found in the first two empirical chapters could be due to differences in firm specific characteristics, in particular firm size. While the US sample consists of non-financial S&P 500 companies, the UK sample consists of non-financial companies included in the FTSE ALL-SHARE index. Due to their larger size, US firms are likely to find it easier to raise external funds, particularly during periods of economic uncertainty, as they tend to be perceived to be less risky (Rajan and Zingales, 1995). On the contrary, UK firms by having comparatively less access to external funds might be forced to marginalise share repurchases in order to reduce their financing needs. Thus, the differences between the US and the UK regarding the factors affecting financial decision-making before and after the financial crisis I found in the

first two empirical projects, might reflect size differences, rather than country-specific differences.

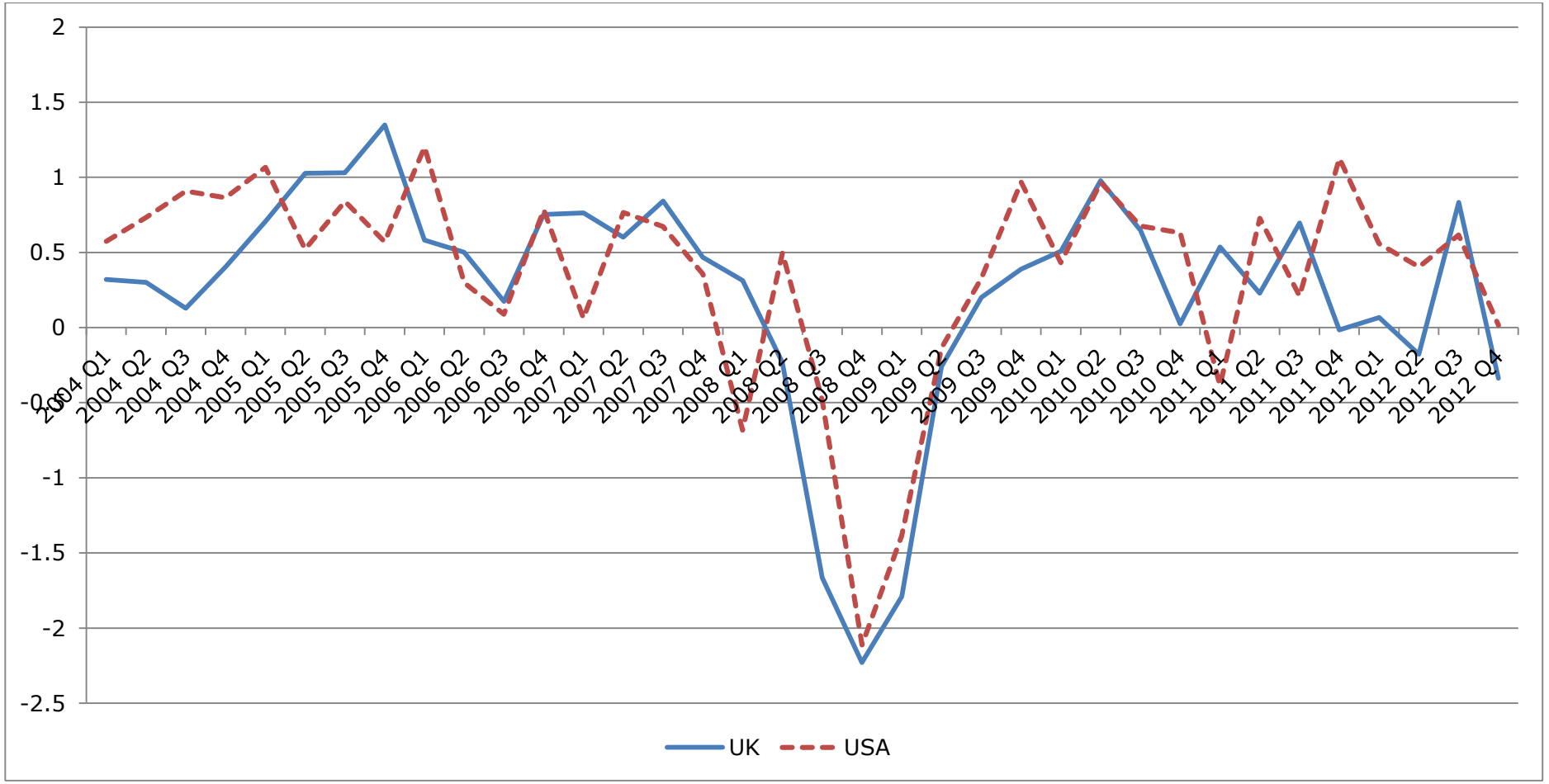
Moreover, the approval for share repurchases in the US is less complicated and can more easily be made on an ad hoc basis than in the UK. Thus, it is possible that US managers were in a better position to utilise share repurchases in a flexible manner in the period after the financial crisis, which was characterised by a high degree of uncertainty. This might have made it easier for US managers to integrate share repurchases systematically into their financial decision-making than for UK managers.

Figure 7 Monthly figures for S&P 500 and FTSE ALL SHARE INDEX between 2004 - 2012



Source: Yahoo Finance (2015), S&P 500 and FTSE ALL SHARE INDEX available at finance.yahoo.com

Figure 8 USA-UK real GDP growth



Source: OECD (2015) Gross Domestic Product available at stats.oecd.org

5.5 Summary

The section reviewed the US and the UK market in terms of their regulatory framework, taxes and ownership structure. It seems that there are significant differences regarding the bankruptcy code, the share repurchases framework, taxation and dividend policy of these two countries. Such differences are likely to influence corporate behaviour and may be the cause of differences regarding the integration of share repurchases into financial decision-making indicated in the first two chapters. More specifically in the first chapter the findings show interdependence between share repurchases, investment and dividends suggesting that share repurchases have become an essential consideration when managers take financial decisions in large US firms. By contrast, the UK findings do not show interdependence between dividends and share repurchases and an incosistent interaction between share repurchases and investment suggesting that in the UK share repurchases are used as a complementary form of payout and not as a substitute. Our analysis should therefore take into account country differences regarding the institutional and economic environment and test if these influence financial decision-making in the two countries. Moreover, our review has shown that the financial crisis originating in 2007-8 may have had a different impact in these two countries due to differences in firm size stemming from sample choice and characteristics. Consequently, our analysis should also consider differences in macroeconomic conditions between the pre and post crisis periods. Finally, potential differences in firm characteristics due to differences in firm size should be accounted for. Summarizing, our analysis suggest to merge the US and UK samples from both the pre and post crisis periods and use firm-specific variables to take account of firm-specific differences as well as country and

time variables (i.e dummy variables) to take into account country and time period differences.

In the following section I will present the methodology followed to investigate if the documented differences between the findings in chapters 3 and 4 are driven by differences in the institutional and economic environment or differences in the firm-specific characteristics.

5.6 Sample specific differences

5.6 Comparative analysis of the sample data

As mentioned earlier, US firms are drawn from the S&P 500 index whereas the UK ones from the UK-all share index. Therefore, due to sample choice, US firms are larger than the UK ones. These differences in size and other firm characteristics might explain to some degree documented differences between the cross-country regression results. Table 30 shows that that the firms in the US sample are significantly larger than the firms in the UK sample are if size is proxied by total assets. The average US firm in the sample is approximately three times larger than the respective UK one. Both distributions regarding size are skewed and more specifically right-tailed as the median is smaller than the average. Looking at the median, which might be a more appropriate measure regarding the aforementioned skewness, I observe that the median US firm is almost 9 times larger than the respective UK one.

Table 36 Total Assets per year 2005-11 (˙000$)

US						
Year	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**	**Median**
2005	271	15,600,000	28,000,000	163,890	265,000,000	6,750,000
2006	272	17,200,000	30,700,000	303,371	275,000,000	7,450,000
2007	272	18,600,000	32,300,000	334,357	276,000,000	8,400,000
2008	272	18,500,000	30,100,000	474,154	226,000,000	7,900,00
2009	272	19,800,000	32,500,000	592,093	231,000,000	8,400,000
2010	272	21,400,000	34,800,000	857,468	299,000,000	8,800,000
2011	272	23,200,000	37,800,000	1,290,883	327,000,000	9,500,000
UK						
Year	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**	**Median**
2005	214	5,103,887	18,600,000	21,377	159,000,000	695,000
2006	214	5,060,269	17,500,000	40,350	152,000,000	755,000
2007	214	5,559,947	18,300,000	49,685	161,000,000	825,000
2008	214	7,100,892	24,200,000	48,108	229,000,000	1,055,000
2009	214	7,277,439	24,400,000	55,788	214,000,000	1,000,000
2010	214	7,953,793	27,261,443	63,020	243,989,470	1,129,776
2011	214	8,323,945	28,652,160	68,599	263,157,720	1,186,875
	Difference in means: Diff= mean(US) - mean(UK), Ho≠0					
2005	10,500,000***					
2006	12,200,000***					
2007	13,000,000***					
2008	11,400,000***					
2009	12,500,000***					
2010	13,400,000***					
2011	14,900,000***					

Additional differences between the US and UK firms can be observed regarding other variables. Table 31 provides descriptive statistics for key variables related to the US and UK sample as well as differences in means testing.

Table 37 Comparative descriptive statistics between the UK and the US sample

2005-2008	UK			US			Diff= mean(UK)- mean(US), H_O Diff=0	
Variable	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.	Difference in means	
DIV	214	0.422	0.275	272	0.212	0.198	0.210	***
REP	214	0.188	0.266	272	0.713	0.538	-0.525	***
INV	214	0.047	0.033	272	0.060	0.046	-0.013	***
LEV	214	0.218	0.137	272	0.207	0.137	0.011	
ROA	214	0.141	0.068	272	0.170	0.071	-0.029	***
DEPR	214	0.038	0.020	272	0.039	0.018	-0.002	
COLTRL	214	0.251	0.204	272	0.262	0.203	-0.011	
RETURN	214	-0.030	0.072	272	0.001	0.053	-0.031	***
OPTION	214	0.273	0.254	272	0.553	0.499	-0.279	***
CASH	214	0.110	0.086	272	0.141	0.128	-0.031	***
FCF	214	0.101	0.058	272	0.132	0.052	0.031	***
SIZE	214	5.912	0.675	272	6.875	0.499	-0.963	***
GROWTH	214	0.046	0.048	272	0.050	0.040	-0.003	
SLIQ	214	1.370	0.842	272	2.356	1.320	-0.985	***
ZSCORE	214	1.890	0.827	272	2.216	1.060	-0.325	***
BETA	214	0.943	0.489	272	1.126	0.472	-0.184	***
TAX	214	0.293	0.105	272	0.323	0.090	-0.03	***
2008-2011	**UK**			**US**			**Difference in means**	
DIV	214	0.426	0.244	272	0.206	0.020	0.007	***
REP	214	0.100	0.139	272	0.564	0.538	-0.460	***
INV	214	0.039	0.030	272	0.048	0.035	-0.009	***
LEV	214	0.209	0.139	272	0.226	0.183	-0.017	
ROA	214	0.129	0.070	272	0.161	0.070	-0.032	***
DEPR	214	0.039	0.021	272	0.040	0.018	-0.001	
COLTRL	214	0.246	0.209	272	0.259	0.213	-0.012	
RETURN	214	0.001	0.070	272	0.002	0.044	-0.001	
OPTION	214	0.242	0.206	272	0.557	0.485	-0.315	***
CASH	214	0.106	0.082	272	0.154	0.125	-0.049	***
FCF	214	0.102	0.053	272	0.065	0.051	0.037	***
SIZE	214	5.991	0.677	272	6.947	0.486	-0.956	***
GROWTH	214	0.046	0.048	272	0.025	0.030	0.021	
SLIQ	214	0.860	0.505	272	3.344	1.557	-2.484	***
ZSCORE	214	1.822	0.814	272	2.193	1.038	-0.370	***
BETA	214	0.943	0.489	272	1.126	0.472	-0.184	***
TAX	214	0.278	0.06	272	0.318	0.04	-0.04	***

LEV: Sum of long term debt plus short term debt scaled by total assets, DIV: Common cash dividends scaled by net income after preferred dividends, *REP*: Stock repurchases to (Net Income before Preferred Dividends - Preferred Dividend Requirement), *INV*: capital expenditures to total assets, *ROA*: EBITDA to total assets, *FCF*: cash flow from operations scaled by total assets, CASH: cash and cash equivalents to total assets, *BETA*: stock's beta, *COLTRL*: net property, plant and equipment to total assets, *ZSCORE*: Altman's Z score, *SIZE*: logarithm of sales, *GROWTH*: sales growth (logSALESt –

logSALESt-1), *DEPRC*: depreciation to total assets, *RETURN*: stock's return calculated as the Log RI year1 -LogRI year0, where RI is the stock's return index from Datastream, *OPTIONS*: Stock options expense to total assets. TAX: Income taxes divided by pretax income *100

The average UK firm appears to have higher dividend higher payouts (DIV) than its US counterpart does. This confirms both earlier and recent observations regarding higher dividend payouts in the UK when compared to other developed economies (Bond et al. 1996; Griffiths and Wall 2007; Cook 2014). This culture of comparatively high and consistent dividends in UK might be related to a traditionally high level of investment by domestic and foreign institutional investors (see Bond et al. 1996; Allen and Michaely 2003; Griffiths and Wall 2007; Cook 2014). The difference in means regarding dividend payout is one of the most noticeable amongst all variables. More specifically, average dividend payouts in the UK sample appear to be twice as high as in the US sample.

Another striking difference is related to share repurchases. US firms in the sample appear to have almost six times higher share repurchases payouts. The fact that UK firms in the sample seem to distribute relatively less via share repurchases is in line with the contentions by Rau and Vermaelen (2002). The difference regarding the use of share repurchase between samples might be attributed to the UK stricter share repurchases regulatory framework. However, the difference might partially be explained by differences in the values of the stock options (OPTIONS) and share liquidity (SLIQ) variables between the two country samples. The US sample firms seem to make greater use of stock options (two times higher) as a form of employee and executive compensation. Moreover, the liquidity of shares from the US sample (SLIQ) is much higher than that of the UK sample. Both the use of stock options and share liquidity have previously been found to positively affect share

repurchases in a number of studies (see Fenn and Liang 1999; Kahle 2000; Bens et al. 2003; Brockman et al. 2008; De Cesari 2011).

Regarding capital structure, there is no statistically significant difference between UK and US firms. However, statistically significant is the difference regarding investment. The investment variable is 1% higher in the US in both periods. In addition, the average UK firm in our sample appears to be riskier in terms of bankruptcy risk (ZSCORE), has lower cash holdings (CASH), is less profitable (ROA), has less Free Cash Flows (FCF) and generates fewer returns (RETURN)[28]. However, UK firms in our sample are less risky in terms of systematic risk (BETA). Finally, as expected, on average UK firm face a lower tax rate (TAX). There are no statistically significant differences in terms of growth opportunities (GROWTH), depreciation (DEPRC) and collateral (COLTRL), between US and UK firms.

Table 32 shows the percentage changes for each variable between 2005-8 and 2008-11. Quite noticeable is that subsequent to the financial crisis, UK firms in our sample drastically reduced their share repurchase payout ratio (on average by 46.81%), whereas the respective decrease for US firms was less than half this amount (20.90%). Another difference is that dividend payout ratios of UK increased on average by 1%, whereas US firms on average reduced them by almost 3%. The aforementioned differences between the US and the UK firms in the sample regarding dividends and share repurchases suggest that UK managers marginalize share repurchases over dividend payments. This is in accordance to the UK findings from Chapter 4 indicating that in the UK share repurchases are used as a complementary form of payout

[28] The difference in returns (RETURN) is only statistically significant in 2005-08.

and not as a substitute, which can be drastically reduced in times of economic uncertainty. Another difference between the two countries concerns profitability. UK firms exhibit a larger decrease in profitability, (-8.51%) versus (-5.29%) in the US. This has implications for the interpretation of changes in payout ratios. Profitability (ROA) is calculated as EBITDA to Total Assets. Therefore, a decrease in ROA indicates a decrease in Net Income. Net Income serves as the denominator in the share repurchases and dividend variables. Therefore, all else equal, the greater decrease in the share repurchase ratio documented in the UK becomes even more profound considering a comparatively higher decrease in the denominator. Finally, we observe that in the post crisis period average US firm increased their leverage by 9.18%, while UK firms on average reduced their leverage by 4.13%. This might be related to firm size as the relatively larger US firms might have had easier access to debt financing during the crisis.

In summary, as the comparative analysis of the US and UK samples indicates, there are indeed significant differences in terms of firm specific characteristics and in particular firm size, free cash flows and stock liquidity. Such characteristics have been identified, by ours as well as previous research(see Rajan and Zingales 1995;Dittmar 2000; Kahle 2000; Bens et al. 2003; Frank and Goyal 2009; Dhanani and Roberts 2009), as important financial decision determinants and are likely to explain to some degree differences in between US and UK financial decision-making.

Moreover, the financial crisis seems to have had a differential impact on UK firms as they, in contrast to US firms, appear to have decreased their leverage. This might be associated to their smaller size and thus having

relatively more difficulties to raise external financing. In addition, UK firms in the sample exhibit a larger decrease in share repurchases payout ratios in the post crisis period. This decrease might be associated with the decrease in leverage as UK firms were not able to fund share repurchases via debt financing. Overall, the pre and post crisis comparative results suggest that I should take into account the time period factor into our analysis. The following section will incorporate and control for these differences into the empirical analysis. This will enable us to test the influence of time and country specific factors as well as firm-level characteristics on financial decision-making and indicate if they are indeed the cause of differences between the US and UK results.

Table 38 Percentage changes (%) for each variable per country between 2005-08 and 2008-11

Variables	$\frac{mean(2011) - mean(2008)}{mean(2008)}$	
	UK	**US**
DIV	0.95%	-2.83%
REP	-46.81%	-20.90%
INV	-17.02%	-20.00%
LEV	-4.13%	9.18%
ROA	-8.51%	-5.29%
DEPR	2.63%	2.56%
COLTRL	-1.99%	-1.15%
RETURN	-103.33%	100.00%
OPTION	-11.36%	0.72%
CASH	-3.64%	9.22%
FCF	0.99%	8.33%
SIZE	1.34%	1.05%
GROWTH	0.00%	-50.00%
SLIQ	-37.23%	41.94%
ZSCORE	-3.60%	-1.04%
BETA	0.00%	0.00%
TAX	-5.12%	-1.55%

5.7 Methodology

This research so far has provided evidence of interdependence in financial decision-making in both the US and the UK. In addition, financial decisions in both countries seem to be driven by the same determinants. However, the findings show noticeable differences between the two countries regarding the integration of share repurchases into firms' financial decision-making. In the UK, in contrast to the US, I do not find evidence of dividend substitution. In addition, the negative interaction between investment and share repurchases, consistent in both periods in the US, holds only in the pre crisis period (2005-08) for UK firms.

Our aim is to investigate whether differences between UK and US financial decision-making can be attributed to institutional differences or differences in firm characteristics. Therefore I need to test and control for the influence of differences due to country specific factors, time period and firm level characteristics in US and UK financial decision-making. In order to do so I construct a combined sample of the S&P 500 index and the FTSE ALL-SHARE index from both 2005-8 and 2008-11. By combining the observations from the US and UK samples I will be able to add appropriate country and time dummy variables as well as control variables for various firm level determinants. The dummy variables will be able to control for all unaccounted country and time specific differences. Therefore, I will be able to identify the presence and influence of differences in financial decision-making between the US and the UK.

5.7.1 The empirical model

Taking into consideration the above in order to meet our objectives I formulate the following system of equations, consisting of one equation for each financial decision under investigation. For every company i, each financial decision is a function of the remaining ones, plus a vector of exogenous control variables including firm specific determinants related to the specific financial decision, a country dummy, and a time period dummy.

As explained earlier I will use a combined country (US-UK) and time period (2005-08, 2008-11) sample. The literature review has identified a number of qualitative differences between the two countries (i.e. regulatory environment, culture). In addition, the financial crisis is expected to have a different impact in the two countries. Therefore, the use of dummy variables is suggested in order to control for qualitative differences between the two countries and periods (Gujarati, 2004).

More specifically, in order to test for potential differences in capital structure related decision-making I add a country dummy in the capital structure regression. The country dummy will be included to control for all unobserved time invariant country specific factors, which may affect capital structure. As previously discussed, such factors are expected to be of particular importance as specifically in the case of bankruptcy regulation. Differences in national bankruptcy codes are expected to affect firms' capital structure (Rajan and Zingales 1995; Acharya et al 2004). Therefore, the dummy variable in the capital structure regression will point out if there are significant differences in the capital structures of the two countries and will indicate their influence after controlling for firm specific characteristics.

As previously discussed, another key difference is related to taxation. Differences in taxation is also expected to impact on the capital structure decision-making in different countries since Modigliani and Miller (1963) argue that debt financing has the advantage of interest expenses being tax deductible. This is possible to consider at firm level with the inclusion of a firm specific tax rate variable.

Concerning the share repurchases equation, since I also expect country specific factors to impact on managers' preference for or ability to use share repurchases I also include a dummy variable in the share repurchases regression. The country dummy will be included to control for time invariant country specific factors, which affect the share repurchase decision such as the regulatory framework. It will allow us to test if there are differences and observe their influence in the use of share repurchases between the two countries, after controlling for firm specific characteristics.

UK firms traditionally exhibit relatively higher dividend payouts (see Bond et al. 1996; Allen and Michaely 2003; Griffiths and Wall 2007; Cook 2014). This suggests a culture of comparatively higher dividend payouts ,which should be accounted for in the dividend regression. In order to test and control for this, I include a country dummy variable in the dividend regression.

Finally, in the investment equation I include a country dummy variable which aims to test and highlight any differences between US and UK firm investment.

Thus, I arrive at the following system of equations,

$$LEV_i = f_1(DIV_i, REP_i, INV_i, Controls_{1i}) + \varepsilon_{1i} \quad (1)$$

$$DIV_i = f_2(LEV_i, REP_i, INV_i, Controls_{2i}) + \varepsilon_{2i} \quad (2)$$

$$REP_i = f_3(LEV_i, DIV_i, INV_i, Controls_{3i}) + \varepsilon_{3i} \quad (3)$$

$$INV_i = f_4(LEV_i, DIV_i, REP_i, Controls_{4i}) + \varepsilon_{4i} \quad (4)$$

where ε_{1i}, ε_{2i}, ε_{3i}, ε_{4i} are stochastic zero mean error terms.

The dependent variables LEV, DIV, REP and INV represent Leverage, Dividends, Share Repurchases and Investment respectively. $Controls_{1i}$, $Controls_{2i}$, $Controls_{3i}$ and $Controls_{4i}$ are the respective vectors of exogenous control variables for each dependent variable. The control variables included in each vector have been identified based on relevant theories and prior empirical research as discussed in chapter 2.2. Therefore, $Controls_{1i}$, $Controls_{2i}$, $Controls_{3i}$ and $Controls_{4i}$ include the same variables[29] as described in Chapter 3.x.

Substituting each of the vectors ($Controls_1$, $Controls_2$, $Controls_3$ and $Controls_4$) with the abovementioned variables I arrive at the following system of equations[30]:

[29] For a detailed discussion regarding proxy selection see chapter 3.x. As previously discussed, theoretical considerations and prior empirical evidence suggests that the same variables are relevant both for the US and the UK context.

[30] As part of sensitivity testing we controlled for industry effects by re-estimating my system of equations including industry dummies in every equation. We did not observe any change in the direction of the relationships under investigation, however there were changes in statistical significance. Since in many cases the industry dummies were insignificant their inclusion most probably increased the coefficients' variance and thus affected their statistical significance.

(1) $LEV_i = \alpha 0 + \alpha 1 DIV_i + \alpha 2 REP_i + \alpha 3 INV_i + \alpha 4 ROA_i + \alpha 5 SIZE_i + \alpha 6 GROWTH_i + \alpha 7 FCF_i + \alpha 8 COLTRL_i + \alpha 9 ZSCORE_i + \alpha 10 TAX + \alpha 11 Cdummy + \alpha 12 Tdummy + \varepsilon_1$

(2) $DIV_i = \beta 0 + \beta 1 LEV_i + \beta 2 REP_i + \beta 3 INV_i + \beta 4 ROA_i + \beta 5 SIZE_i + \beta 6 GROWTH_i + \beta 7 FCF_i + \beta 8 BETA_i + \alpha 9 Cdummy + \alpha 10 Tdummy + \varepsilon_2$

(3) $REP_i = \gamma 0 + \gamma 1 LEV + \gamma 2 DIV_i + \gamma 3 INV_i + \gamma 4 SIZE_i + \gamma 5 GROWTH_i + \gamma 6 FCF_i + \gamma 7 OPTIONS_i + \gamma 8 RETURN_i + \gamma 9 SLIQ_i + \gamma 10 CASH_i + \alpha 11 Cdummy + \alpha 12 Tdummy + \varepsilon_3$

(4) $INV = \delta 0 + \delta 1 LEV_i + \delta 2 DIV_i + \delta 3 REP_i + \delta 4 ROA_i + \delta 5 SIZE_i + \delta 6 GROWTH_i + \delta 7 DEPRC_i + \alpha 8 Cdummy + \alpha 9 Tdummy + \varepsilon_4$

5.7.2 Sample and Data

The initial samples of US S&P 500 and UK ALL-SHARE index firms consist of 272 and 214 firms respectively. By combining these observations across both 2005-08 and 2008-11, I arrive at 972 observations.

Following the US and UK based literature regarding capital structure and payout research I use the proxies[31] mentioned in Table 33.

Since both the US and UK results suggest interdependence in financial decision-making I follow the same estimation techniques as in Chapters 3 and 4. More specifically, beyond the traditional OLS, I utilises 2SLS and 3SLS which are expected to deal with endogeneity issues.

OLS, 2SL and 3SLS estimations are based on the assumption that data follow a normal distribution. In order to test this I employ three normality tests (Table 34). The first two, the skewness test and the kurtosis test, test the skewness and kurtosis of our data against those of a normal distribution. The third combines these two tests in an overall test statistic similar to the Jarque-

[31] For a detailed discussion regarding proxy selection see chapter 3.3.4

Bera test for normality. Table 34 shows that our data are not normally distributed. I winsorize[32] the data at the conventional 5% as the data is subject to outliers. This will deal with potential outliers by smoothing the tails of the distribution. The winsorized sample, which has a distribution that is closer to the normal distribution, will be used for the OLS, 2SLS and 3SLS estimation.

In addition, I use two alternative non-parametric estimation techniques, median regression and regression with bootstrapped standard errors. The skewness test has shown that the distribution of our data is skewed. In such cases, the mean is not appropriate for interpretation whereas the median remains highly informative. Therefore, Hao and Naiman (2007) suggest the median-regression over conditional-mean regression modelling as OLS, 2SLS and 3LS.

In addition, I utilise regression analysis with bootstrapped standard errors. This method does not require distributional assumptions such as the residuals to be normally distributed. Instead of assuming a normal distribution, this estimation technique resamples the regression's residuals so it can calculate approximately their underlying distribution. Guan (2003) and Fox (2008) suggest that this estimation method can give more accurate inferences than Least Squares estimations in the presence of non-normality. Non-parametric estimations deal with the non-normality of our data, however they do not deal with the endogeneity expected to be present in our system of equations.

In order to consider whether our model suffer from multicollinearity problems,

[32] Regression results from the winsorized data have produced more statistically significant variables and higher R-squares compared results from to the non-winsorized data confirming the distortion from outliers.

I calculate the Variance Inflation Factor (VIF) for each variable. Tables 46-49 presents the VIF factors for each variable for every regression in the model. Results do not suggest multicollinearity problems. Gujarati (2004) notes that if a variable has a VIF factor greater than 10 the variable may merit further investigation. As in the sample, VIF factors range from 1.10 to 3.35, I consider that multicollinearity does not present a problem in this case.

In order to establish the validity of the 2SLS and 3SLS estimations I employ two instrument validity tests. Instrumental variables need to satisfy two conditions to be considered valid. First, as the instrumental variable will replace the endogenous regressor in the regression, they need to be relevant. This means that the variation of the instrumental variable is related to the variation of the endogenous regressor (Gujarati 2004; Stock and Watson 2011). Secondly, instruments need to be exogenous. This means that the instrumental variable should not correlate to the error term of the regression where the endogenous regressor is included.

I use the Cragg-Donald Wald test for weak identification. Low values of the Cragg-Donald Wald F-statistic (i.e lower than 10) indicate weak instruments (Stock and Yogo 2005).The Cragg-Donald Wald F-statistic (Table 36) ranges from 1.41 in the share repurchases regression to 5.55 in the leverage indicating weak instruments. This indicates that the instruments are weak. Woolridge (2006) reports that in the presence of weak instruments 2SLS and 3SLS can produce poorer results than OLS as the relevant estimators can have large standard errors and large asymptotic bias. I use the Sargan statistic to test for instrument exogeneity. The null hypothesis is that all instruments are exogenous i.e. the instrumental variables do not correlate with to the error

term of the regression where the endogenous regressors are included. If the computed chi-square exceeds the critical chi-square value, I reject the null hypothesis, which means that at least one instrument is correlated with the error term and therefore the estimates based on the chosen instruments are not valid. Table 40 shows that only in the leverage (LEV) and share repurchases (REP) regressions instruments are exogenous. However, as reported earlier, in these regressions instruments have been found to be weak. Therefore the 2SLS and 3SLS results should be treated with caution because, as Woolridge (2006) explains, invalid instruments can produce worse results than OLS, as the relevant 2SLS and 3SLS estimators can have large standard errors and large asymptotic bias.

However, Gujarati (2004) states that in practice it is not easy to find instruments, which satisfy both the conditions of instrument relevance and instrument exogeneity. The problem of weak instruments is quite common in studies, which utilise simultaneous equation techniques. In most cases instrument validity test are not reported (see Jensen et al*.* 1992; Noronha et al*.* 1996; Adedeji 1998; Crutchley et al*.* 1999; Ding and Murinde 2010, Aggarwal and Kyaw 2010). In addition, a number of the aforementioned seem to suffer from weak instruments as indicated by their regression results. A typical example is in Jensen (1992) where the variable fixed assets, serving as an instrument for leverage, is not statistically significant in the leverage equation. Similar issues are present in most of the aforementioned studies. Nevertheless, instrument validity is not often tested. This might be due to the difficulty of finding valid instruments underlined by Gujarati (2004). Therefore, due to the presence of weak instruments I also consider results from OLS estimations. In addition, non-parametric estimations are employed to check

the robustness of the results. Non-parametric estimations, do no deal with endogeneity issues, however, they deal with non-normality and thus are likely more valid than OLS.

Table 39 Definition of variables combined US/UK sample

Variable name	Variable acronym	Description
Leverage	LEV	Sum of long term debt plus short term debt scaled by by net income after preferred dividends[33]
Dividend payout ratio	DIV	Common cash dividends scaled by net income after preferred dividends[34]
Share repurchase	REP	Share repurchase expenditure scaled by net income after preferred dividends
Investment	INV	Capital expenditure scaled by total assets
Profitability	ROA	Return on assets measured as EBITDA scaled by total assets
Cash balance	CASH	Cash and cash equivalents scaled by total assets
Free cash flow	FCF	Cash flow from operations scaled by total assets
Firm risk	BETA	Firm's market beta
Collateral	COLTRL	Assets that can be used as collateral measured as net property, plant and equipment scaled by total assets
Bankruptcy risk	ZSCORE	Altman's Z score calculated as $Z = 1.2\frac{Working\ Capital}{Total\ Assets} + 1.4\frac{Retained\ Earnings}{Total\ Assets} + 3.3\frac{EBIT}{Total\ Assets} + 0.6\frac{MarketValue\ of\ Equity}{Total\ Liabilities} + .999\frac{Sales}{Total\ Assets}$
Firm size	SIZE	Logarithm of sales
Growth opportunities	GROWTH	Sales Growth calculated as $logSALES_t - logSALES_{t-1}$
Depreciation	DEPRC	Depreciation scaled by total assets
Total stock return	RETURN	Stock's return calculated as the Log RI_{t+1} - $LogRI_t$, where RI is the stock's return index from Datastream. The return index presents the theoretical growth in value of a theoretical stock holding. This holding is deemed to return a daily dividend, which is used to purchase new units of the stock at the current price. The gross dividend is used. RI on the base date =100, then: $RI_t = RI_{t-1}*(Pi_t/PI_{t-1})*(1+D*N-1)$, Where: RI_t= return index on day t, RI_{t-1}= return index on previous day, PI_t= price index on day t, PI_{t-1} = price index on previous day, D= dividend yield % on day t, N = number of working days in the year (taken to be 260).
Tax Rate	Acronym	(Income Taxes / Pre-tax Income * 100)
Country Dummy	Cdummy	Dummy variable, takes the value of 1 if UK firm, zero otherwise
Time period dummy	Tdummy	Dummy variable, takes the value of 1 for the 2008-11 period, zero otherwise

[33]Negative net income observations are removed from the sample to ensure sensible payout observations.
[34]Negative net income observations are removed from the sample to ensure sensible payout observations.

Table 40 Normality tests- combined US/UK sample

Variable	Obs	Pr(Skewness)	Pr(Kurtosis)	Joint Test Prob>chi2
DIV	972	0.000	0.000	0.000
ROA	972	0.000	0.000	0.000
DEPR	972	0.000	0.000	0.000
INV	972	0.000	0.000	0.000
COLTRL	972	0.000	0.000	0.000
LEV	972	0.000	0.000	0.002
REP	972	0.000	0.000	0.000
RETURN	972	0.000	0.000	0.000
OPTION	972	0.000	0.000	0.000
CASH	972	0.000	0.000	0.000
FCF	972	0.000	0.000	0.000
SIZE	972	0.011	0.009	0.000
GROWTH	972	0.0000	0.000	0.000
SLIQ	972	0.000	0.000	0.000
ZSCORE	972	0.000	0.001	0.000
BETA	972	0.001	0.000	0.000
TAX	972	0.000	0.000	0.000

LEV: Sum of long term debt plus short term debt scaled by total assets, DIV: Common cash dividends scaled by net income after preferred dividends, *REP*: Stock repurchases to (Net Income before Preferred Dividends - Preferred Dividend Requirement), *INV*: capital expenditures to total assets, *ROA*: EBITDA to total assets, *FCF*: cash flow from operations scaled by total assets, CASH: cash and cash equivalents to total assets, *BETA*: stock's beta, *COLTRL*: net property, plant and equipment to total assets, *ZSCORE*: Altman's Z score, *SIZE*: logarithm of sales, *GROWTH*: sales growth (logSALESt – logSALESt-1), *DEPRC*: depreciation to total assets, *RETURN*: stock's return calculated as the Log RI year1 -LogRI year0, where RI is the stock's return index from Datastream, *OPTIONS*: Stock options expense to total assets. TAX: Income taxes divided by pretax income *100

5.8 Findings and analysis

5.8.1 Non-parametric estimations

Tables 37 and 39 report the non-parametric estimation results.

Both the median and the bootstrapping regression show that, while controlling for firm-level characteristics, both the country and the time dummy are statistically significant in the share repurchases equation. More specifically, the country dummy is statistically significant and negative indicating that, all else equal, the average UK firm has a lower share repurchases payout ratio than the average US firm. This seems in line with the contention of Rau and Vermaelen (2002) that the stricter UK regulatory environment can lead to the lower use of share repurchases as a distribution method. In addition, the time period dummy is statistically significant and negative suggesting that in the post crisis period US and UK firms decreased their share repurchase payout ratios. This might relate to scarce funding opportunities and decreased cash flows prevalent in the post crisis period. Moreover, the non-parametric estimations regarding the share repurchase regression show that dividends and investment have a negative effect on share repurchases while leverage has a positive one. These results are in line with the Budget Constraint Hypothesis of McCabe (1979) and closely resemble the US results from Chapter 3; however, they differ from the UK findings in Chapter 4. In the UK results identified a positive impact of dividends on share repurchases. This difference can be attributed to the fact that in the combined US-UK sample the country and time period dummies captured differences in institutional factors and macroeconomic conditions, which were not accounted for in the individual country estimations. In the first two chapters, the individual country and split

period samples (2005-08 and 2008-11), did not allow us to control either for country specific differences (e.g the stricter share repurchases regulatory framework and bankruptcy code in the UK, the culture of higher dividend payouts in the UK) nor for the effect of different market conditions (scarce investment and funding opportunities in the post crisis period).

In the dividend regression, non-parametric estimations show that the time period dummy is insignificant. This highlights the inflexible nature of dividend payouts. It seems that UK and US managers tried to maintain their dividend payout ratios throughout the financial crisis. The country dummy in the dividend regression is statistically significant and positive. This shows that ceteris paribus UK firms have higher dividend payout ratios than their US counterparts. This is in line with a number of previous studies (see Bond et al. 1996; Griffiths and Wall 2007; Cook 2014). It has previously been argued, that the traditionally high level of investment by domestic and foreign institutional investors in the UK stock market has lead to a culture of comparatively high and consistent dividends in listed firms (see Bond et al. 1996; Allen and Michaely 2003; Griffiths and Wall 2007; Cook 2014). For example, pension funds and insurance companies are holding on average 40% - 50% of UK equities for the 1994 - 2000 period. However, domestic pension funds have been moving out of the UK equity market after 2002, (FT, 2012 a, b). Nevertheless, dividend payout ratios remained high (Griffiths and Wall 2007; Cook 2014). This might be attributed to the reluctance of managers to reduce dividends (see Allen and Michaely, 2003). Moreover, both the median and bootstrapping estimations for the dividend regression show that share repurchases and investment have a negative effect on dividends while leverage a positive one. This is in accordance with the Budget Constraint

Theory of McCabe (1979) where dividends are identified as a use of funds which competes with other uses of funds (i.e investment and share repurchases) and are positively affected by access to funds, such as debt (i.e. leverage). The aforementioned results regarding the combined US-UK sample dividend regression resemble the US results from Chapter 3, which suggest a negative interaction between dividends, share repurchases and investment. However, the UK findings in Chapter 4 do not suggest an effect of share repurchases on dividends. The significance of the country dummy in the combined US-UK sample dividend regression suggests that the reason for this difference is the culture of higher dividend payouts in the UK, which has not been accounted for in the UK sample estimations.

In the investment regression, non-parametric estimations show that the time period dummy is statistically significant and negative. Most likely, in the post-crisis period, US and UK firms decreased their capital expenditures due to scarce investment and funding opportunities. The country dummy is negative, but only statistically significant in the bootstrapping regression. This indicates that the average UK firm, all else equal, invests less than its US counterpart. Furthermore, the non-parametric estimations indicate that dividends and share repurchases have a negative effect on investment, in line with the Budget Constraint Theory of McCabe (1979). Dividends have a negative effect on investment in both the US and UK individual sample estimations. However, investment seems to be consistently, affected only by share repurchases in the US estimations and not in the UK ones. This difference can be attributed to the fact that the combined US-UK sample estimations allowed us to take into account the changes in economic conditions regarding the pre and post crisis environment. The inclusion of the time dummy in the combined US-UK sample

estimations was able to capture and account for qualitative differences such as the severe shortage of investment capital and liquidity in the post crisis period, which are likely to influence financial decision-making. Firms' capital structure does not seem to influence investment. It seems that, US and UK firms do not lever up to fund investment opportunities.

With regard to firms' capital structure, the time dummy in the leverage regression indicates that there are not any statistically significant differences in leverage ratios between the pre and post crisis period when firm characteristics are accounted for. However, the country dummy is statistically significant and positive indicating that UK firms, all else equal, have a higher leverage. This is surprising given that the UK has a stricter bankruptcy code than the US. The UK code is quite creditor friendly, which increases the risk that firms facing cash flow problems will not be able to meet their interest payment obligations and will be liquidated quickly. Therefore, UK firms should carry less debt ceteris paribus. However, it seems that the stricter UK bankruptcy code does not have a significant impact on the capital structure choice. Dividends seem to have a positive effect on leverage in line with the Pecking Order Theory and the Budget Constraint Theory. The Pecking Order Theory suggests that in the long term high payout ratios will lead to higher leverage since firms with high dividend payout ratios have lower retained earnings and therefore will need to rely more on debt to fund investment opportunities. According to McCabe (1979), a higher use of funds as payouts and investment would lead to a higher need for sources of funds as debt financing). However, the debt-financing variable used in this study (debt to total assets) has its limitations. It does not specifically cover additional debt financing to which the Budget Constraint Theory actually refers to.

Nevertheless, frequent use of additional debt financing would lead to higher leverage ratios in the long term, ceteris paribus. Share repurchases do not seem to have an effect on leverage ratios. However, investment seems to have a negative effect on leverage. Overall, this suggests that, US and UK firms tend to funds for investment opportunities by reducing share repurchases and dividends instead of levering up.

Regarding the exogenous control variables, for each financial decision, non-parametric estimations for the combined US-UK sample resemble results from the individual country sample estimations. This suggests that financial decision-making in both countries is influenced by the same factors.

In the share repurchase regression, as far the control variables the concerned, both non-parametric estimations (median and bootstrapped standard errors regressions) show a positive and statistically significant effect of free cash flows (FCF) on share repurchases. This is line to Free Cash Flow theory, which suggests that share repurchases can be used as a mechanism to reduce the agency costs free cash flows. Likewise, supporting the option-funding hypothesis of Kahle (2000), the coefficient on stock options (OPTIONS) is consistently positive and statistically significant. Firm size (SIZE) seems to have a positive effect on share repurchases but is only statistically significant in the median regression. Dittmar (2000) reports similar results. Dittmar (2000) argues that, if size relates to information asymmetries then larger firms are also likely to be misvalued and use share repurchases to take advantage of possible undervaluation. The stock return variable is negative but statistically significant only in the bootstrapping estimation. If a company is undervalued, it will most likely exhibit a history of low returns. The stock return variable was used as a proxy for undervaluation as (Dittmar 2000)

argues that if a company is undervalued, it will most likely exhibit a history of low returns (Dittmar 2000). Therefore, the negative effect of the stock return variable indicates that firms with a history of poor returns repurchase their shares to exploit and or signal their undervaluation. The coefficient of growth opportunities (GROWTH) is negative in both non-parametric estimations; however, it is statistically significant only in the median regression. According to Rozeff (1982) and Crutchley et al. (1999), firms with growth opportunities are expected to retain earnings instead of distributing them in order to avoid the costs of external financing. The stock liquidity variable (SLIQ) is negative and statistically significant in the median regression. This is in line with De Cesari (2001) who suggests that firms' attempt to enhance the liquidity of their shares by engaging in increased trading in their own shares via share repurchases. Cash holdings (CASH) do not appear to have an effect on share repurchases.

In the dividend regression, both non-parametric estimations show a negative effect of growth opportunities (GROWTH) on dividends. This suggests that, as in the case of share repurchases, growing firms which require financing for their increasing working capital requirements tend to obtain funds by reducing alternative expenditures (i.e dividend and share repurchases) and avoid the costs of external financing. Profitability (ROA) has a positive effect on dividends as predicted by the Pecking Order Theory. It seems that dividends are not used as a mechanism to reduce agency costs of free cash flows as the free cash flows (FCF) variable has a negative effect on dividends. Firm size (SIZE) has a positive and statistically significant effect only in the median regression indicating that larger firms have higher payout ratios. The coefficient on firm's systematic risk (BETA) is negative in both non-parametric

estimations however; it is statistically significant only in the median regression. This is in line with Rozeff (1992) who argues that more risky firms are expected to pay lower dividends in order to reduce the probability of requiring costly external finance.

In the leverage regression, both non-parametric estimations identify profitability (ROA), bankruptcy risk (ZSCORE), collateral (COLTRL) and firm size (SIZE) as capital structure determinants. The respective coefficients of the aforementioned variables are signed in accordance to the Trade Off theory. Profitability, size and collateral have a positive effect on leverage, while bankruptcy risk a negative one. However, surprisingly, the tax rate (TAX) is not statistically significantly related to leverage. The growth opportunities (GROWTH) variable is statistically insignificant.

Finally, in the investment equation the coefficients on profitability (ROA), growth opportunities (GROWTH), size (SIZE) and depreciation (DEPRC) are positive as expected and statistically significant. The positive coefficient of the profitability variable is in line with McCabe (1979) who argues that sources of funds (earnings) have a positive effect on uses of funds (investment). The positive effect of depreciation on investment is also in line with McCabe (1979) who supports that depreciation identifies cash flows, which can be used to fund investment. However, the positive effect of depreciation on investment is predicted by Abel and Eberly (2012), who argue that, as the depreciation rate reflects the users' cost of capital, investment is a linear function of the depreciation rate. The positive effect of the firm size (SIZE) variable on investment suggests that larger firms invest more. Finally, the positive effect of the growth variable (GROWTH) indicates that firms invest more in the presence of growth opportunities.

5.8.2 Parametric estimations

Tables 38 and 40, present parametric estimation' results (OLS, 2SLS and 3SLS). The parametric estimations have produced the following similar results to the non-parametric estimations.

In the share repurchases regression, both non-parametric and parametric estimations indicate that both the country dummy and the time dummy have a negative effect on share repurchases. Moreover, the effect of dividends, investment and capital structure on share repurchases is consistently negative. In addition, as far control variables are concerned, both parametric and non-parametric estimations confirm free cash flows, options, growth opportunities and firm size as important share repurchases determinants.

In the dividend regression, parametric estimations confirm the positive effect of the country dummy and that share repurchases and investment, have a negative effect on dividends. No discrepancies are observed between the parametric and non-parametric estimations regarding the control variables in the dividend regressions. In addition, parametric estimations confirm the negative effect of growth opportunities (GROWTH), systematic risk (BETA) and free cash flows (FCF) and the positive effect of profitability (ROA) and firm size (SIZE).

In the investment regression, both parametric and non-parametric estimations show that the time period dummy and the country dummy are statistically significant and negative. Moreover, investment appears to be negatively influenced by dividends and share repurchases and positively by leverage. Regarding control variables parametric estimations confirm that investment is

positively affected by profitability (ROA), firm size (SIZE) and depreciation (DEPRC).

In the leverage regression parametric and non-parametric estimations show the time dummy is generally statistically insignificant. In addition, dividends have a positive effect on leverage. Regarding control variables, parametric estimations show that leverage is affected negatively by bankruptcy risk (ZSCORE) and positively by collateral (COLTRL) and firm size (SIZE).

Although the non-parametric and parametric estimations are quite similar, a few discrepancies can be observed.

In the dividend regression, OLS and 2SLS, similar to the non-parametric estimations show that the time period dummy is statistically insignificant. However, the 3SLS estimation shows that the time dummy is negative and statistically significant. However, in this case I draw conclusions from the OLS, and the non-parametric estimations, since the instruments are weak and 3SLS estimations are known to magnify any misspecification bias in the system.

In the leverage regression estimations are not conclusive regarding the effect of the country dummy. The OLS estimation shows that the country dummy is positive and statistically significant. This is in line with the non-parametric estimations. However, the country dummy is statistically significant and negative in both 2SLS and 3SLS. However, as mentioned earlier 2SLS and 3SLS suffer from weak instruments and therefore their results should be treated with caution. Share repurchases do not seem to have an effect on leverage ratios according to OLS and 2SLS however they do have a positive effect according to 3SLS. In this case we consider OLS and non-parametric estimations to be more valid due to the weak instrument problem. Moreover, as in the case of the non-parametric estimations, OLS shows that investment

has a negative effect on leverage. 2SLS do not show a statistically significant effect of investment on leverage while 3SLS shows a positive one. This discrepancy can be attributed to the presence of weak instruments. There are some differences between non-parametric and parametric estimations regarding the effect of growth opportunities (GROWTH), profitability (ROA) and free cash flows (FCF). The coefficient, on growth opportunities is insignificant in the non-parametric estimations, negative in OLS and positive in 2SLS and 3SLS. Profitability (ROA) has a positive effect on leverage in non-parametric estimations and OLS, an insignificant effect in 2SLS and a negative one in 3SLS. Finally, the coefficient FCF is negative in non-parametric estimations and OLS, and insignificant in 2SLS and 3SLS. Regarding the aforementioned difference, we believe the non-parametric estimations to be comparatively more valid considering the presence of weak instruments in the 2SLS and 3SLS estimations and the non-normality of our data.

In the share repurchases regression, OLS and 3SLS estimations, in contrast to non-parametric estimations, indicate that cash holdings (CASH) have a negative impact on share repurchases a positive and statistically significant effect of free cash flows (FCF) on share repurchases. However, since 3SLS suffers from weak instrument problems and OLS does not account for non-normality in our data this relationship might be biased.

Finally, in the investment equation OLS as both non-parametric estimations suggest a positive effect of growth opportunities (GROWTH) on investment. In contrast, 2SLS and 3SLS suggest a negative one. Again, we believe the non-parametric estimations to be more valid.

It seems that the presence of weak instruments in the instrumental variables estimations has caused a few discrepancies between the non-parametric and

parametric estimations. Therefore, considering the weak instrument issue we believe the non-parametric results to be more valid. However, non-parametric estimations do not deal with the endogeneity in financial decision-making, which our results indicate. Therefore, in the cases that non-parametric and parametric estimations have produced similar results then these are likely to be valid. In the few cases that estimation methods produced different results these should be treated with caution.

Summarizing, the results indicate that, there are significant differences in financial decision-making between the UK and the US. We identify that country specific factors lead to differences in the dividend, share repurchases and capital structure decision. More specifically, the UK institutional and economic environment appears influence firms' decision-making so that UK firms tend to engage less in share repurchases, have higher dividend payout ratios and higher leverage ratios. The negative significance of the country dummy may be attributed to the stricter, in terms of share repurchases approval, timing, price, volume and disclosure requirements, regulatory framework in the UK as supported by Rau and Vermaelen (2002). UK firms also appear to maintain higher payout ratios than their US counterparts as indicated by the positive significance of the country dummy in the dividend regression. This might be attributed to a culture of high dividend payouts in the UK (see Bond et al. 1996; Griffiths and Wall 2007; Cook 2014). In addition, managers might be reluctant to cut dividends as empirical evidence show that markets do not welcome dividend reductions and that these are followed by share price reductions (see Allen and Michaely 2003. The positive effect of the country dummy in the capital structure is unexpected considering the stricter bankruptcy code in the UK. Therefore, differences in country specific factors

and macroeconomic conditions seem to affect the integration of share repurchases in financial decision-making and explain discrepancies between the findings from Chapter 3 (US) and Chapter 4 (UK).

Table 41 Non-parametric (median and bootstrapping) estimation results - Dependent variables, combined US/UK sample

		Median				Bootstrapping			
		INV	DIV	REP	LEV	INV	DIV	REP	LEV
Independent variables	INV		-0.95***	-1.14***	-0.96***		-0.98***	-1.43***	-0.73***
	DIV	-0.01***		-0.06***	0.05*	-0.01**		-0.05	0.05*
	REP	-0.01***	-0.03**		0.01	-0.02**	-0.03		0.01
	LEV	0.01	0.21***	0.16***		0.01	0.30*	0.18***	
	No. observations	972	972	972	972	972	972	972	972

***, **, *** indicate statistical significance at 10%, 5%, 1% level respectively**

LEV: long term debt to total assets (book values), *DIV*: dividend payout (Common Dividends (Cash) to (Net Income before Preferred Dividends - Preferred Dividend Requirement), *REP*: Stock repurchases to (Net Income before Preferred Dividends - Preferred Dividend Requirement), *INV*: capital expenditures to total assets,

Table 42 Summary of OLS, 2SLS and 3SLS regression statistics - Dependent variables, combined US/UK sample

		Dependent Variables											
		OLS				2SLS				3SLS			
		INV	DIV	REP	LEV	INV	DIV	REP	LEV	INV	DIV	REP	LEV
Independent variables	INV		-1.11***	-1.66****	-0.78***		-1.04***	-0.91***	-0.84		-2.65***	-2.52***	1.50***
	DIV	-0.02***		-0.08*	0.07***	-0.24***		-0.46**	0.69***	-0.34***		-0.07	1.00***
	REP	-0.02***	-0.03*		0.01	-0.10***	-0.11		0.01	-0.12***	-0.33***		0.23***
	LEV	0.01**	0.20***	0.17**		0.12***	0.34***	0.30		0.05***	0.79***	0.48***	
	No. observations	972	972	972	972	972	972	972	972	972	972	972	972

*, **, *** indicate statistical significance at 10%, 5%, 1% level respectively

LEV: long term debt to total assets (book values), *DIV*: dividend payout (Common Dividends (Cash) to (Net Income before Preferred Dividends - Preferred Dividend Requirement), *REP*: Stock repurchases to (Net Income before Preferred Dividends - Preferred Dividend Requirement), *INV*: capital expenditures to total assets

Table 43 Non-parametric (median and bootstrapping) estimation results - Control variables, combined US/UK sample

		Median				Bootstrapping			
		INV	DIV	REP	LEV	INV	DIV	REP	LEV
Independent variables	GROWTH	0.08***	-1.16***	-0.90***	0.07	0.13***	-1.45**	-1.01	-0.06
	SIZE	0.01***	0.02**	0.05***	0.06***	0.01	-0.01	0.01	0.05***
	ROA	0.05***	1.10***		0.26*	0.06***	1.09***		0.28*
	FCF		-1.02***	1.60***	-0.55***		-1.52***	1.67***	-0.47***
	COLTLR				0.28***				0.21***
	ZSCORE				-0.05***				-0.04***
	BETA		-0.06***				-0.01		
	OPTIONS			0.14***				0.135***	
	RETURN			-0.11				-0.47**	
	CASH			-0.04				-0.06	
	SLIQ			-0.02***				-0.01	
	DEPRC	0.94***				0.82***			
	TAX				-0.01				0.01
	Cdummy	-0.01	0.23***	-0.47***	0.07***	-0.02***	0.25***	-0.55***	0.03**
	Tdummy	-0.01***	0.01	-0.09***	-0.01	-0.01***	-0.01	-0.19***	0.01
	constant	-0.03***	-0.01	0.25**	-0.14	-0.05***	0.32***	0.67***	-0.06
	no. observations	972	972	972	972	972	972	972	972
	R-squared	0.26	0.18	0.29	0.14	0.35	0.17	0.21	0.35

LEV: Sum of long term debt plus short term debt scaled by total assets, DIV: Common cash dividends scaled by net income after preferred dividends, REP: Stock repurchases to (Net Income before Preferred Dividends - Preferred Dividend Requirement), INV: capital expenditures to total assets, ROA: EBITDA to total assets, FCF: cash flow from operations scaled by total assets, CASH: cash and cash equivalents to total assets, BETA: stock's beta, COLTRL: net property, plant and equipment to total assets, ZSCORE: Altman's Z score, SIZE: logarithm of sales, GROWTH: sales

growth (logSALESt – logSALESt-1), DEPRC: depreciation to total assets, RETURN: stock's return calculated as the Log RI year1 -LogRI year0, where RI is the stock's return index from Datastream, OPTIONS: Stock options expense to total assets. TAX: Income taxes divided by pretax income *100, Tdummy: 1 for 2008-11 zero otherwise, Cdummy: 1 for UK firm, zero otherwise

Table 44 Summary of OLS, 2SLS and 3SLS regression statistics - Control variables, combined US/UK sample

		Dependent variables											
		OLS				2SLS				3SLS			
		INV	DIV	REP	LEV	INV	DIV	REP	LEV	INV	DIV	REP	LEV
Independent variables	GROWTH	0.09***	-1.84***	-2.57***	-0.32***	-0.53***	-1.98***	-3.34***	0.92**	-0.75***	-2.21***	-2.53***	1.95***
	SIZE	0.01***	0.03***	0.04**	0.05***	0.01*	0.02*	0.04**	0.03*	0.01	0.01	0.02	0.01
	ROA	0.09***	1.16***		0.37***	0.31***	1.10***		-0.35	0.47***	1.34***		-1.10***
	FCF		-1.05***	2.02***	-0.43***		-0.72**	2.03***	0.30		-0.07	2.41***	0.07
	COLTLR				0.19***				0.26***				0.11**
	ZSCORE				-0.06***				-0.05***				-0.02***
	BETA		-0.03**				-0.03*				-0.01		
	OPTIONS			0.25***				0.25***				0.18***	
	RETURN			-0.16				-0.20				0.22*	
	CASH			-0.30**				-0.24				-0.18**	
	SLIQ			-0.01				-0.02				0.02**	
	DEPRC	1.02***				0.83***				0.21***			
	TAX				-0.05				-0.05				-0.02
	Cdummy	-0.01***	0.245***	-0.44***	0.04***	-0.01	0.19***	-0.18***	-0.14**	-0.02**	0.05	-0.45***	-0.09**
	Tdummy	-0.01***	-0.01	-0.18***	-0.01	-0.05***	-0.02	-0.38***	-0.01	-0.02***	-0.06***	-0.20***	0.04***
	constant	-0.02**	-0.01	0.38***	-0.05	-0.04*	0.10	0.42***	-0.01	0.07***	0.23***	0.41***	-0.17**

	No. observations	972	972	972	972	972	972	972	972	972	972	972	972
	R-squared	0.48	0.33	0.29	0.46	-	-	-	-	-	-	-	-

*LEV: Sum of long term debt plus short term debt scaled by total assets, DIV: Common cash dividends scaled by net income after preferred dividends, REP: Stock repurchases to (Net Income before Preferred Dividends - Preferred Dividend Requirement), INV: capital expenditures to total assets, ROA: EBITDA to total assets, FCF: cash flow from operations scaled by total assets, CASH: cash and cash equivalents to total assets, BETA: stock's beta, COLTRL: net property, plant and equipment to total assets, ZSCORE: Altman's Z score, SIZE: logarithm of sales, GROWTH: sales growth (logSALESt – logSALESt-1), DEPRC: depreciation to total assets, RETURN: stock's return calculated as the Log RI year1 -LogRI year0, where RI is the stock's return index from Datastream, OPTIONS: Stock options expense to total assets.*TAX: Income taxes divided by pretax income *100, Tdummy: 1 for 2008-11 zero otherwise, Cdummy: 1 for UK firm, zero otherwise

Table 45 Instrumental variables overidentification and weak identification test- combined US/UK sample

	Overidentification test for all instruments -Sargan statistic (p-values)	Weak identification test - Cragg-Donald Wald F statistic
REP	0.42	1.41
DIV	0.00	5.23
INV	0.00	4.77
LEV	0.29	5.55

* The null hypothesis for the overidentification test is that instruments are valid

* As a rule of thumb Cragg-Donald Wald F-statistics below 10 indicate weak instruments (Stock and Yogo, 2005)

Table 46 Share repurchases regression VIF factors

Variable	VIF
Cdummy	2.98
OPTION	2.29
CASH	2.13
FCF	1.88
SLIQ	1.83
SIZE	1.81
GROWTH	1.5
DIV	1.41
RETURN	1.32
LEV	1.3
Tdummy	1.16
INV	1.13
Mean VIF	1.73

LEV: Sum of long term debt plus short term debt scaled by total assets., DIV: Common cash dividends scaled by net income after preferred dividends, *REP*: Stock repurchases to (Net Income before Preferred Dividends - Preferred Dividend Requirement), *INV*: capital expenditures to total assets, *ROA*: EBITDA to total assets, *FCF*: cash flow from operations scaled by total assets, CASH: cash and cash equivalents to total assets, *BETA*: stock's beta, *COLTRL*: net property, plant and equipment to total assets, *ZSCORE*: Altman's Z score, *SIZE*: logarithm of sales, *GROWTH*: sales growth (logSALESt – logSALESt-1), *DEPRC*: depreciation to total assets, *RETURN*: stock's return calculated as the Log RI year1 -LogRI year0, where RI is the stock's return index from Datastream, *OPTIONS*: Stock options expense to total assets, TAX: Income taxes divided by pretax income *100, Tdummy: 1 for 2008-11 zero otherwise, Cdummy: 1 for UK firm, zero otherwise

Table 47 Investment regression VIF factors

Variable	VIF
Cdummy	2.28
SIZE	1.74
REP	1.51
GROWTH	1.42
DIV	1.4
ROA	1.36
LEV	1.16
DEPR	1.15
Tdummy	1.12
Mean VIF	1.46

LEV: Sum of long term debt plus short term debt scaled by total assets., DIV: Common cash dividends scaled by net income after preferred dividends, *REP*: Stock repurchases to (Net Income before Preferred Dividends - Preferred Dividend Requirement), *INV*: capital expenditures to total assets, *ROA*: EBITDA to total assets, *FCF*: cash flow from operations scaled by total assets, CASH: cash and cash equivalents to total assets, *BETA*: stock's beta, *COLTRL*: net property, plant and equipment to total assets, *ZSCORE*: Altman's Z score, *SIZE*: logarithm of sales, *GROWTH*: sales growth (logSALESt – logSALESt-1), *DEPRC*: depreciation to total assets, *RETURN*: stock's return calculated as the Log RI year1 -LogRI year0, where RI is the stock's return index from Datastream, *OPTIONS*: Stock options expense to total assets, TAX: Income taxes divided by pretax income *100, Tdummy: 1 for 2008-11 zero otherwise, Cdummy: 1 for UK firm, zero otherwise

Table 48 Dividend regression VIF factors

Variable	VIF
Cdummy	2.82
FCF	2.51
ROA	2.33
REP	1.76
SIZE	1.73
INV	1.36
GROWTH	1.35
Tdummy	1.18
LEV	1.16
BETA	1.1
Mean VIF	1.73

LEV: Sum of long term debt plus short term debt scaled by total assets., DIV: Common cash dividends scaled by net income after preferred dividends, *REP*: Stock repurchases to (Net Income before Preferred Dividends - Preferred Dividend Requirement), *INV*: capital expenditures to total assets, *ROA*: EBITDA to total assets, *FCF*: cash flow from operations scaled by total assets, CASH: cash and cash equivalents to total assets, *BETA*: stock's beta, *COLTRL*: net property, plant and equipment to total assets, *ZSCORE*: Altman's Z score, *SIZE*: logarithm of sales, *GROWTH*: sales growth (logSALESt – logSALESt-1), *DEPRC*: depreciation to total assets, *RETURN*: stock's return calculated as the Log RI year1 -LogRI year0, where RI is the stock's return index from Datastream, *OPTIONS*: Stock options expense to total assets, TAX: Income taxes divided by pretax income *100, Tdummy: 1 for 2008-11 zero otherwise, Cdummy: 1 for UK firm, zero otherwise

Table 49 Leverage regression VIF factors

Variable	VIF
ROA	3.35
Cdummy	3.29
INV	3.03
FCF	2.72
COLTRL	2.68
SIZE	1.78
REP	1.77
ZSCORE	1.7
GROWTH	1.49
DIV	1.46
Tdummy	1.19
TAX	1.1
Mean VIF	2.13

LEV: Sum of long term debt plus short term debt scaled by total assets., DIV: Common cash dividends scaled by net income after preferred dividends, *REP*: Stock repurchases to (Net Income before Preferred Dividends - Preferred Dividend Requirement), *INV*: capital expenditures to total assets, *ROA*: EBITDA to total assets, *FCF*: cash flow from operations scaled by total assets, CASH: cash and cash equivalents to total assets, *BETA*: stock's beta, *COLTRL*: net property, plant and equipment to total assets, *ZSCORE*: Altman's Z score, *SIZE*: logarithm of sales, *GROWTH*: sales growth (logSALESt – logSALESt-1), *DEPRC*: depreciation to total assets, *RETURN*: stock's return calculated as the Log RI year1 -LogRI year0, where RI is the stock's return index from Datastream, *OPTIONS*: Stock options expense to total assets, TAX: Income taxes divided by pretax income *100, Tdummy: 1 for 2008-11 zero otherwise, Cdummy: 1 for UK firm, zero otherwise

Regarding the control variables in the share repurchases, dividend, capital structure and investment regressions the combined US-UK sample estimations resemble those obtained from the individual country sample estimations. Therefore, our findings confirm that the influence of firm specific characteristics does not differ between the US and the UK. Share repurchases are positively influenced by free cash flows and stock options while negatively by growth opportunities. These results are in line with the Free Cash Flow theory and the option-funding hypothesis (see Kahle 2000). The findings regarding dividend determinants support the Free Cash Flow theory and the Pecking Order Theory as free cash flows, profitability and growth opportunities

affect accordingly on dividends. The main determinants regarding capital structure seem to be bankruptcy risk, profitability and collateral, which are signed according to the Trade-Off Theory. Finally, profitability and depreciation confirm the importance of financial constraints and the impact of the depreciation rate on the investment decision.

5.9 Conclusion

This chapter's objective was to investigate whether differences between the US-UK results are driven by country specific differences or by differences in firm characteristics. This study used a combined US-UK firm sample and included country and time dummies in its modelling. Thus, we were able to test the degree to which differences in financial decision-making between the US and the UK are driven by the firm-specific characteristics of the firms in the two samples and to which degree they are driven by differences in the institutional and economic environment in the two countries.

This chapter contributes to our understanding of how national differences in the development of capital and financial markets as well as regulatory frameworks are likely to influence corporate behaviour. I have employed a number of parametric and non-parametric estimations to investigate this and deal with interdependence in financial decision-making as well as non-normality in our data. The use of the instrumental variable approach (2SLS and 3SLS) is prone to weak instrument issues present in similar studies in the finance literature (see Noronha et al. 1996; Adedeji 1998; Crutchley et al. 1999; Ding and Murinde 2010). As our instrumental variables appear to be weak in every equation and hence may perform poorly (see Gujarati 2004; Stock and Yogo 2005) we based our conclusions on our non-parametric

estimations. Nevertheless, we did not observe significant discrepancies between different estimation methods, which suggest that our findings are robust.

Our findings show that there are significant differences, between the UK and the US as far as the share repurchases, dividends and capital structure decisions are concerned. Specifically, the combined US-UK sample share repurchase regressions have shown that while controlling for firm specific characteristics, country specific factors lead to a lower use of share repurchases in the UK negative effect possibly due to the stricter regulatory framework as supported by Rau and Vermaelen (2002). Moreover, the combined US-UK sample dividend regressions indicate that UK firms, all else equal, seem to try to maintain higher dividend payout ratios than their US counterparts. This might be attributed to a culture of high dividend payouts in the UK as well as the reluctance of managers to reduce these (see Bond et al. 1996; Allen and Michaely 2003; Griffiths and Wall 2007; Cook 2014). Finally, the UK environment seems to have a positive effect in the capital structure despite the stricter bankruptcy code in the UK. This might be associated to the historically higher UK dividend payout ratios, which in the long term might have lead to increased debt financing needs in order to be maintained. It seems that differences in country specific factors can affect the integration of share repurchases in financial decision-making and explain discrepancies between findings from Chapter 3 (US) and Chapter 4 (UK). Moreover, the significance of the time dummy in the investment and share repurchases conditions suggests that differences in the macroeconomic conditions can affect financial decision-making and in turn can explain differences between the US and UK findings.

Regarding share repurchases, dividend, capital structure and investment determinants, I observe no disparities between results from the combined US-UK sample estimations and those from the individual country sample estimations. Free cash flows and stock options have a positive impact on share repurchases while growth opportunities a negative one. These results are in line with the Free Cash Flow theory and the option-funding hypothesis (see Kahle 2000). Free cash flows, profitability and growth opportunities influence dividends in line with Free Cash Flow theory and the Pecking Order Theory. Capital structure is mainly driven by bankruptcy risk, profitability and collateral. Their impact on capital structure is in line with the Trade-Off Theory. Finally, profitability and depreciation positively affect the investment decision underlining the importance of financial constraints and the impact of the depreciation rate.

In general, the combined US-UK sample estimations support prior literature which suggests that, national differences in terms of regulatory frameworks, corporate governance and the development of financial markets can affect corporate decision-making (e.g. Bennedsen and Nielsen 2010, La Porta et al., 2000). Such differences seem to explain dissimilarities between the US and the UK in terms of the integration of share repurchases into financial decision-making. Our findings are expected to be of importance to investors and regulators as they show that, without considering country specific factors, it is not feasible to generalise economist concerns that share repurchases can be detrimental to firms' ability to create value through investment (FINNOV, 2012) and for leading to the excessive leverage of companies (Foroohar 2013).

In addition, the comparative analysis of the US and UK samples indicates, that there are indeed significant differences in terms of firm specific characteristics and in particular firm size, free cash flows and stock liquidity. Such characteristics have been identified, by this as well as previous research(see Rajan and Zingales 1995;Dittmar 2000; Kahle 2000; Bens et al. 2003; Frank and Goyal 2009; Dhanani and Roberts 2009), as important financial decision determinants and are likely to explain to some degree differences between US and UK financial decision-making.

6. Conclusion, limitations and suggestions for future research

6.1 Conclusion

This study investigated the interactions between share repurchases and key financial decisions namely investment, dividends and leverage in US and UK firms. Its objective was to explore whether share repurchases are integrated into US and UK firms' financial decision-making or whether they are merely an afterthought and therefore not systematically related to managers' principal financial decisions. The primary motive for this study was to address concerns that in the US and the UK market share repurchases can be detrimental to firms' ability to create value through investment (FINNOV, 2012) and can lead to the excessive leverage of companies (Foroohar, 2013).

This study contributed to our understanding of financial decision-making in a number of ways. In the US, the documented robust interdependence, for both the pre and post crisis periods, between uses of funds namely, share repurchases, dividends and investment suggest that share repurchases are accounted for when other financial policies are set. Specifically the findings

provide empirical support to the dividend substitution hypothesis and to concerns that share repurchases can undermine productive investment. In the UK, where share repurchases are also well established, the results indicate that share repurchases are less consistently integrated in firms' financial decision making.

Considering the different findings the question arose, whether they are driven by different institutional contexts or, possibly, by differences in the sample characteristics, since the size of S&P 500 companies tends to much larger than that of FTSE All Share Index companies. The closer investigation of the US-UK differences suggests that, country specific factors do indeed influence corporate behaviour, which supports the contentions of Bennedsen and Nielsen (2010) and La Porta et al. (2000).

This study has also addressed methodological concerns regarding earlier research into financial decision-making. We have seen in the literature review that the phenomenon of share repurchases has raised concerns regarding their effect on other financial decision especially concerning investment, dividends and leverage. In addition, extant theories and empirical research suggest a joint investigation of the aforementioned financial decisions. However, this suggestion has been mostly ignored by earlier research, where each financial decisions have been investigated in isolation, thus leading to misspecification and endogeneity concerns. In order to deal with these concerns, this study investigated share repurchases, dividends, investment and leverage within a simultaneous equation framework estimated by two-stage Least Squares (2SLS) and three-stage Least Squares (3SLS) (Gujarati, 2004). Since 2SLS and 3SLS estimations suffer from weak instrument problems, this study also

used non-parametric estimations, namely median regressions and regressions with bootstrapped standard errors, to check the robustness and validity of its findings. Non-parametric estimations, also help to address normality issues in financial data usually ignored in earlier research.

The first chapter of this thesis investigated the interactions between share repurchases and dividends, investment and leverage in the US market. As share repurchases are especially prevalent in the USA, both in terms of magnitude and frequency (Dittmar 2008, Floyd et al. 2013), it was expected that US firms are particularly likely to integrate share repurchase programs systematically into their financial decision-making. Indeed, this research indicates that both in the period before and after the credit crunch key financial decisions about share repurchases, dividends and investment were interrelated. Specifically, our findings show a robust negative relationship between share repurchases and investment. This suggests that US managers consider share repurchases as an important alternative to investment when they set their corporate policies. This finding appears to provide empirical support to concerns that share repurchases might undermine productive investment (Lazonick 2008; FINNOV 2012). However, the fact that growth opportunities relate consistently and negatively to share repurchases mitigates these concerns to some extent. The US findings further indicate a negative interaction between dividends and investment, confirming earlier evidence by McCabe (1979) and Adedeji (1998). This result, combined with the aforementioned negative interaction between investment and share repurchases, supports McCabe's (1979) Budget Constraint Hypothesis, which suggests that payout policies and investment are competing uses of funds. In addition, in line with previous literature (Grullon and Michaely 2002; Jiang et

al. 2013; Kulchania 2013), the findings show a robust negative association between share repurchases and dividends, indicating dividend substitution.
In order to check if our US findings can be generalized to other markets we extended our study to the UK, where share repurchases are also fairly well established. In addition, the US and the UK display differences in terms of the legal and institutional environment, thus making the UK the ideal setting to further our study. Our results suggest differences between the US and the UK regarding the integration of share repurchases into firms' financial decision-making. More specifically, the UK findings do not show a consistent interaction between share repurchases and investment. In addition, the UK findings suggest that share repurchases are used as a complementary form of payout and not as a substitute. In general, the UK findings suggest that share repurchases are not systematically related to managers' other principal financial decisions.

Chapter 5 sought to explore if the differences between the US and UK findings can be attributed to country specific differences or to firms specific characteristics. The findings support the contention that national differences in terms of regulatory frameworks, corporate governance and the development of financial markets can affect corporate decision-making (e.g. Bennedsen and Nielsen 2010, La Porta et al. 2000). Our findings indicate that the UK environment leads to a lower use of share repurchases in the UK, possibly due to the stricter regulatory framework as supported by Rau and Vermaelen (2002). Moreover, UK firms seem to try to maintain higher dividend payout ratios than their US counterparts, possibly due to a culture of high dividend payouts. Such differences seem to explain differences between the US and the UK in terms of the integration of share repurchases into financial decision-

making. Therefore, without considering country specific factors, it is not feasible to generalise economists' concerns that share repurchases can be detrimental to firms' ability to create value through investment (FINNOV, 2012) and for leading to the excessive leverage of companies (Foroohar 2013).

Overall, our findings have implications for policymakers, shareholders and future research. The documented negative interaction between share repurchases and investment is of particular interest to policymakers and shareholders as it supports economists' concerns that share repurchases might undermine productive investment (see Laurent 2015; FINNOV 2012). In addition, our findings provide empirical support to the contention that national differences in institutional settings, including the regulatory environment, may influence corporate behaviour (Rajan and Zingales 1995; Bond et al., 1996; Short and Keasey 1999; La Porta et al., 2000 Armour et al. 2002; Dhanani 2005; Bennedsen & Nielsen 2010). This is of particular importance to policymakers as our findings show that the non-integration of share repurchases into UK financial making and therefore their inconsistent interaction with investment might be related to the stricter UK regulatory framework. Therefore, in the US where concerns regarding the negative impact of share repurchases on investment are substantiated, regulatory authorities might consider a stricter regulatory framework regarding share repurchases. From a methodological point of view, our findings regarding the strong interdependence between both forms of payout and investment lend support to McCabe's (1979) contention that corporate financial decision-making should be investigated using simultaneous equation techniques.

6.2 Potential limitations of the current and suggestions for future research

This study employed both parametric and non-parametric estimations to investigate financial decision-making in the US and the UK. The 2SLS and 3SLS estimations were used to deal with the expected interdependence in financial decision-making suggested by extant theories and empirical evidence. Indeed, our findings confirm this expectation. In the US, the findings suggest interdependence between uses of funds, namely share repurchases, investment and dividends. In the UK, we document interdependence between dividends and investment; and between share repurchases and investment in the pre crisis period (2005-08). Although 2SLS and 3SLS are expected to deal with endogeneity, their efficiency is questioned in the presence of weak instruments. The relevant tests have shown that, in both country samples (US, UK)and for both periods (2005-08, 2008-11) all of the equations suffer from weak instruments, although we chose them based on prior literature and theoretical considerations. This raises concerns regarding the reliability of the results as 2SLS and 3SLS estimators can perform poorly when weak instruments are used (Gujarati 2004; Stock and Yogo 2005). Specifically, as Woolridge (2006) explains, invalid instruments can produce worse results than OLS, as the relevant 2SLS and 3SLS estimators can have large standard errors and large asymptotic bias. Thus, in our case OLS results are considered to be more valid than 2SLS and 3SLS. However, OLS estimations require a normal distribution of the data which is not the case with our sample. Our non-parametric estimations are expected to deal with non-normality issues. Therefore, we draw conclusions from the non-parametric estimations (median regressions and regressions with bootstrapped standard errors). Although

these estimators deal with the non-normality of the data, they do not deal with endogeneity expected to be present in our system of simultaneous equations. Therefore, a suggestion for further research is to identify appropriate instruments for principal financial decisions such as share repurchases, dividends, investment and capital structure. This seems to be an issue with earlier studies and appears to remain unresolved. As the majority of earlier research has looked into each financial decision in isolation (Faulkender et al 2006; Aggarwal and Kyaw 2010) a surprisingly small percentage of studies have employed the use of simulation equation estimations (see Jensen et al. 1992; Noronha et al. 1996; Adedeji 1998; Crutchley et al. 1999; Ding and Murinde 2010, Aggarwal and Kyaw 2010). However, given the results of instrument testing on our samples, we expect that these studies are also likely to have suffered from weak instrument problems. Therefore, the identification of appropriate instruments is of particular importance in order to increase the validity of estimations and inferences.

Caution must also be used in the interpretation of dummy variable results. Chapter 5 sought to explore if the differences between the US and UK findings can be attributed to country specific differences such as institutional factors, culture and regulatory environment. In order to do so this study utulised dummy variables to control for qualitative differences between the two countries. However, one must be careful in interpreting these differences. The dummy variables will simply point out the differences, if they exist, but they cannot identify specifically the cause of these differences i.e institutional factors. The identification of quantitative variables to control for such country specific factors may assist in disentangling separate influences (e.g institutional factors, cultural factors, bankruptcy code) on financial decision making.''

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